

FIG. 1A

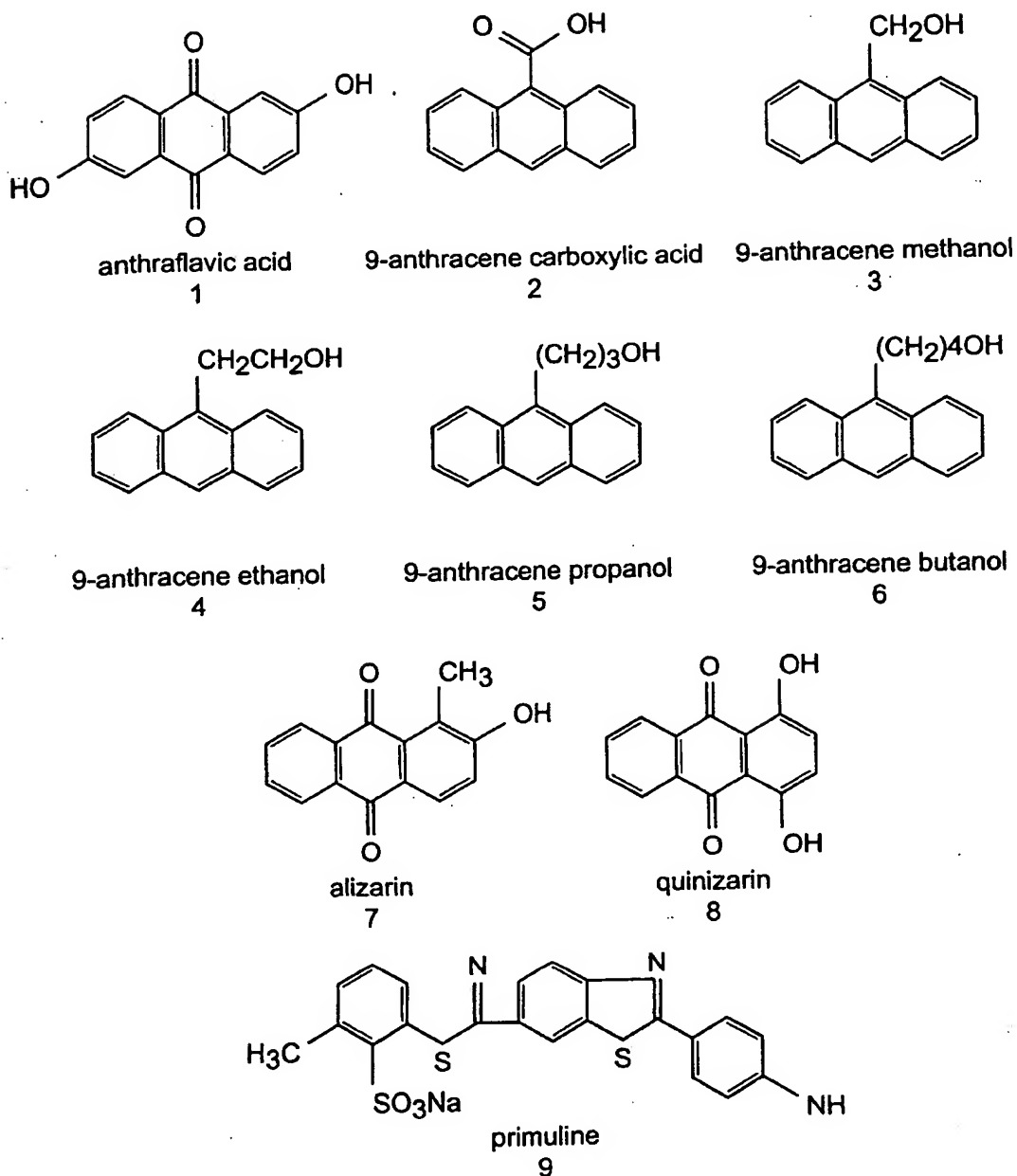
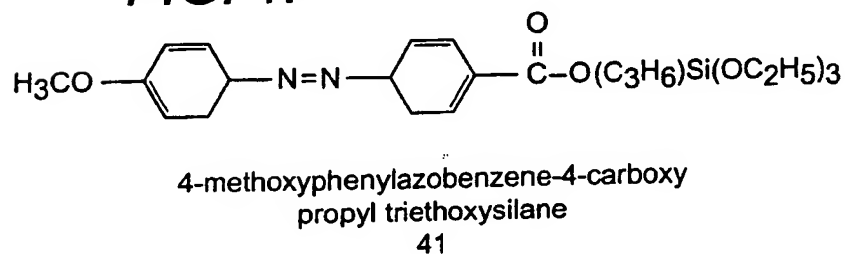
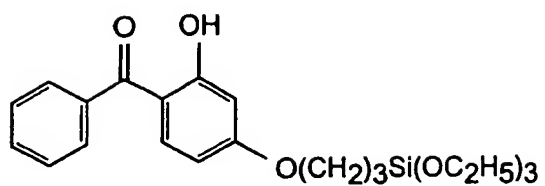


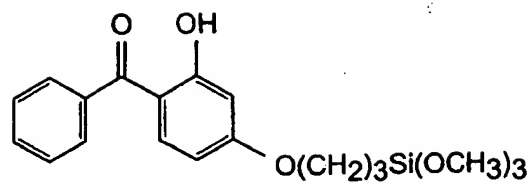
FIG. 1F



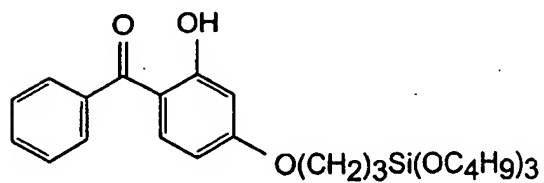
**FIG. 1B**



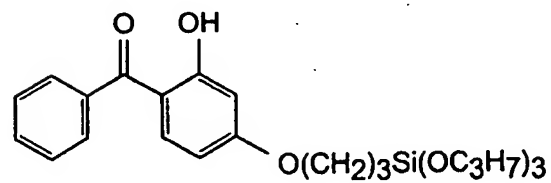
2-hydroxy-4-(3-triethoxysilylpropoxy)-  
diphenylketone  
10



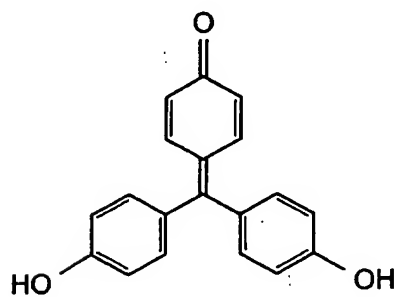
2-hydroxy-4-(3-trimethoxysilylpropoxy)-  
diphenylketone  
11



2-hydroxy-4-(3-tributoxysilylpropoxy)-  
diphenylketone  
12



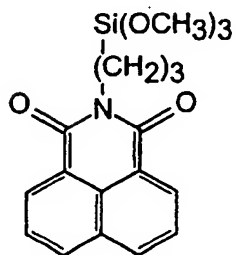
2-hydroxy-4-(3-tripropoxysilylpropoxy)-  
diphenylketone  
13



rosolic acid  
14



triethoxysilylpropyl-1,8-naphthalimide  
15

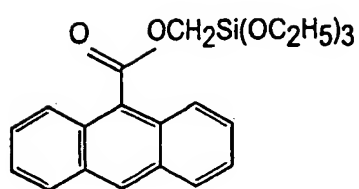


trimethoxysilylpropyl-1,8-naphthalimide  
16

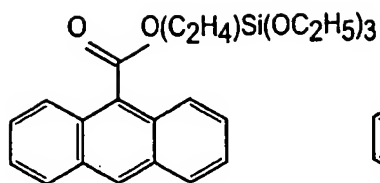


tripropoxysilylpropyl-1,8-naphthalimide  
17

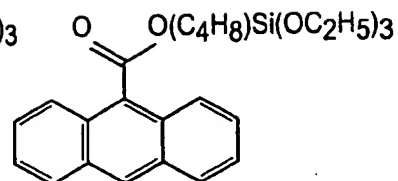
**FIG. 1C**



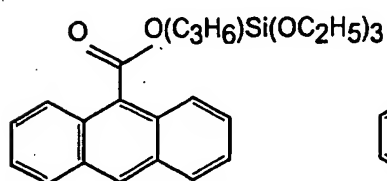
9-anthracene carboxy-methyl  
triethoxysilane (TESAC)  
18



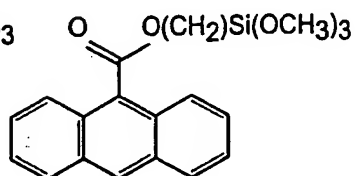
9-anthracene carboxy-ethyl  
triethoxysilane  
19



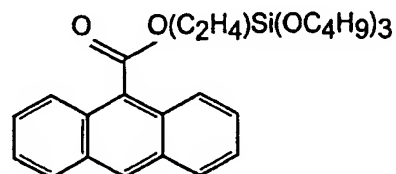
9-anthracene carboxy-butyl  
triethoxysilane  
20



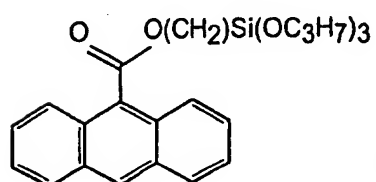
9-anthracene carboxy-propyl  
triethoxysilane (TESAC)  
21



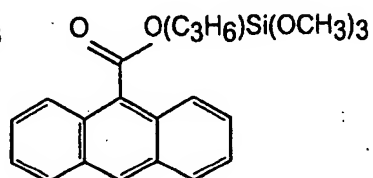
9-anthracene carboxy-methyl  
trimethoxysilane  
22



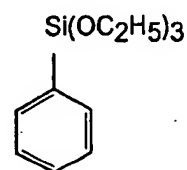
9-anthracene carboxy-ethyl  
tributoxysilane  
23



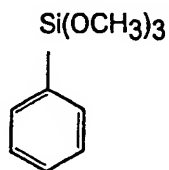
9-anthracene carboxy-methyl  
tripropoxysilane  
24



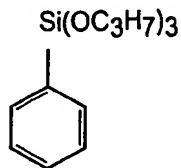
9-anthracene carboxy-methyl  
trimethoxysilane  
25



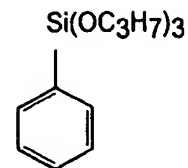
phenyltriethoxysilane  
26



phenyltrimethoxysilane  
27

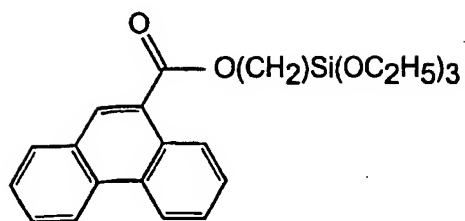


phenyltripropoxysilane  
28

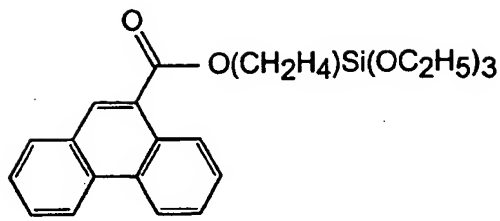


phenyltriethoxysilane  
29

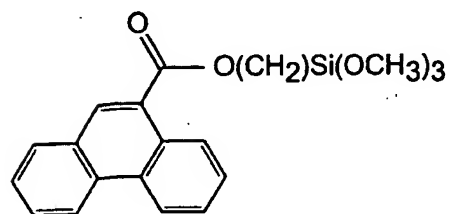
FIG. 1D



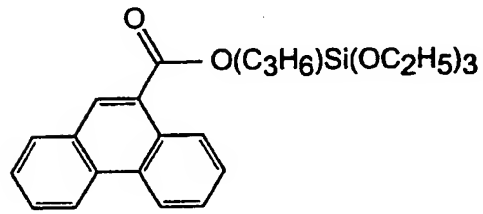
10-phenanthrene carboxy-methyl  
triethoxysilane  
29



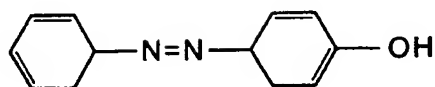
10-phenanthrene carboxy-ethyl  
triethoxysilane  
30



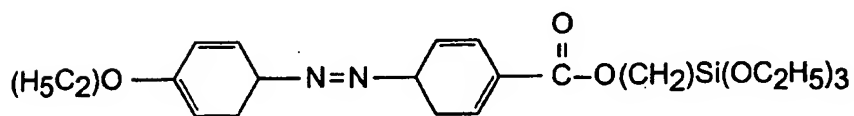
10-phenanthrene carboxy-methyl  
trimethoxysilane  
31



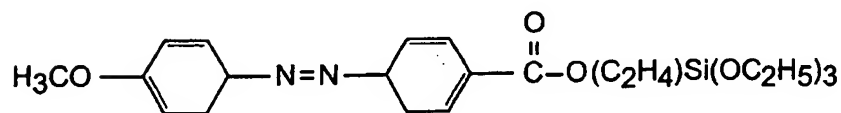
10-phenanthrene carboxy-propyl  
triethoxysilane  
32



4-phenylazophenol  
33



4-ethoxyphenylazobenzene-4-carboxy  
methyl triethoxysilane  
34

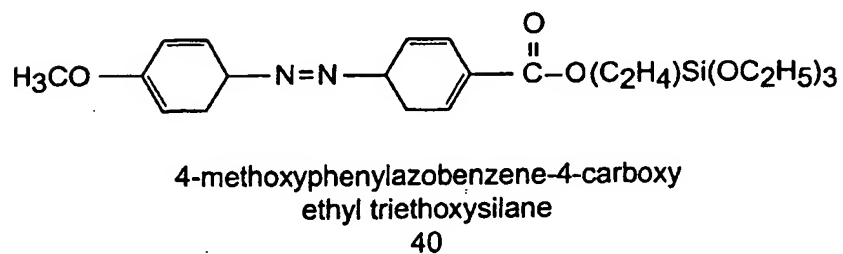
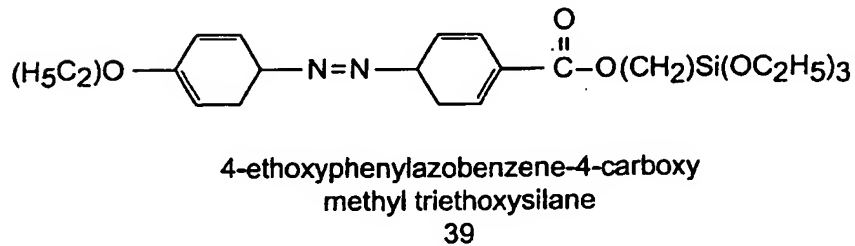
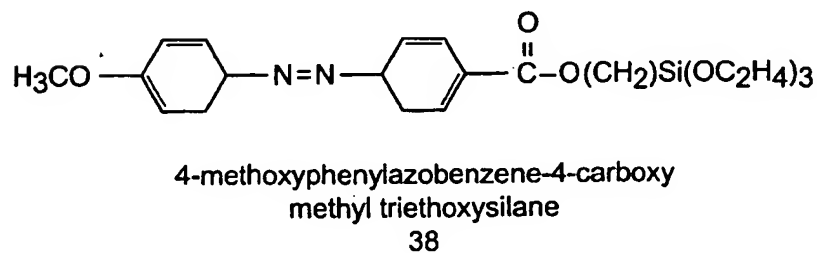
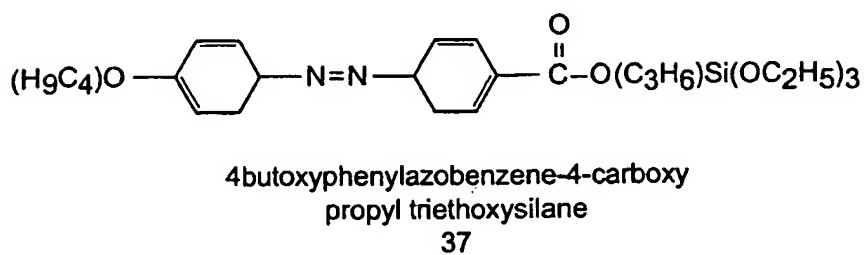


4-methoxyphenylazobenzene-4-carboxy  
ethyl triethoxysilane  
35

$$\text{(H}_5\text{C}_2\text{)O}-\text{C}_6\text{H}_4-\text{N}=\text{N}-\text{C}_6\text{H}_4-\text{C}(=\text{O})-\text{O}(\text{C}_3\text{H}_7)\text{Si}(\text{OC}_2\text{H}_5)_3$$

4-ethoxyphenylazobenzene-4-carboxy  
propyl triethoxysilane

36



# TGA

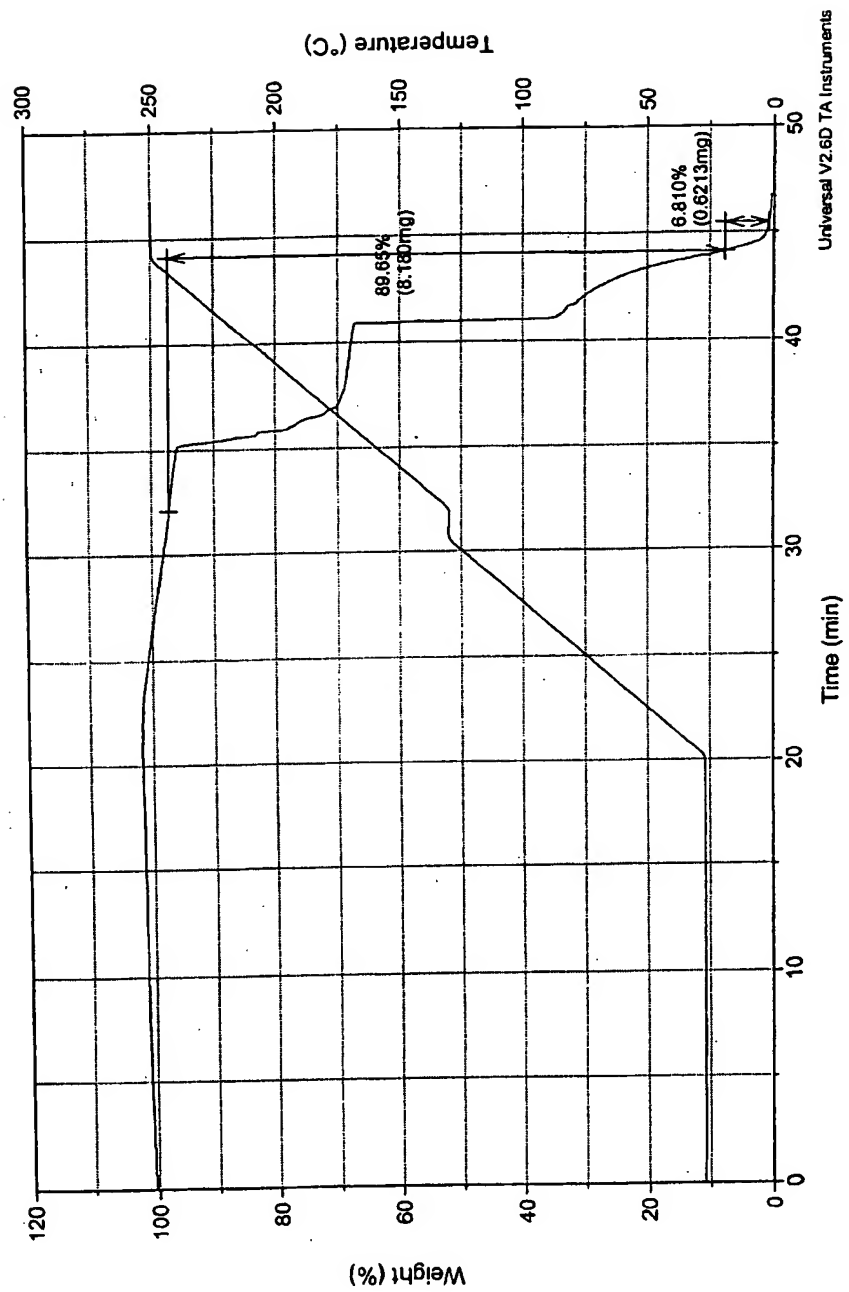


Figure 2

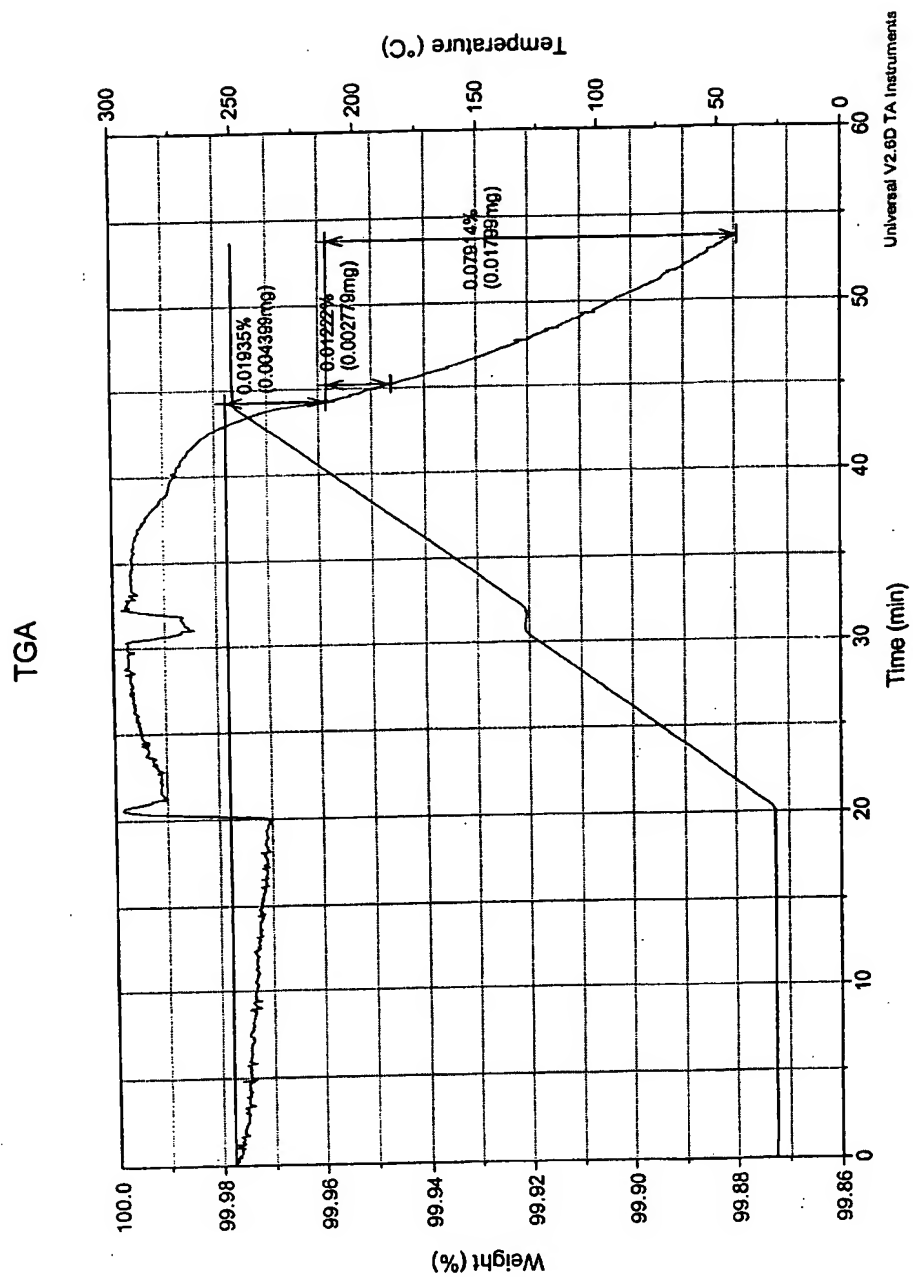
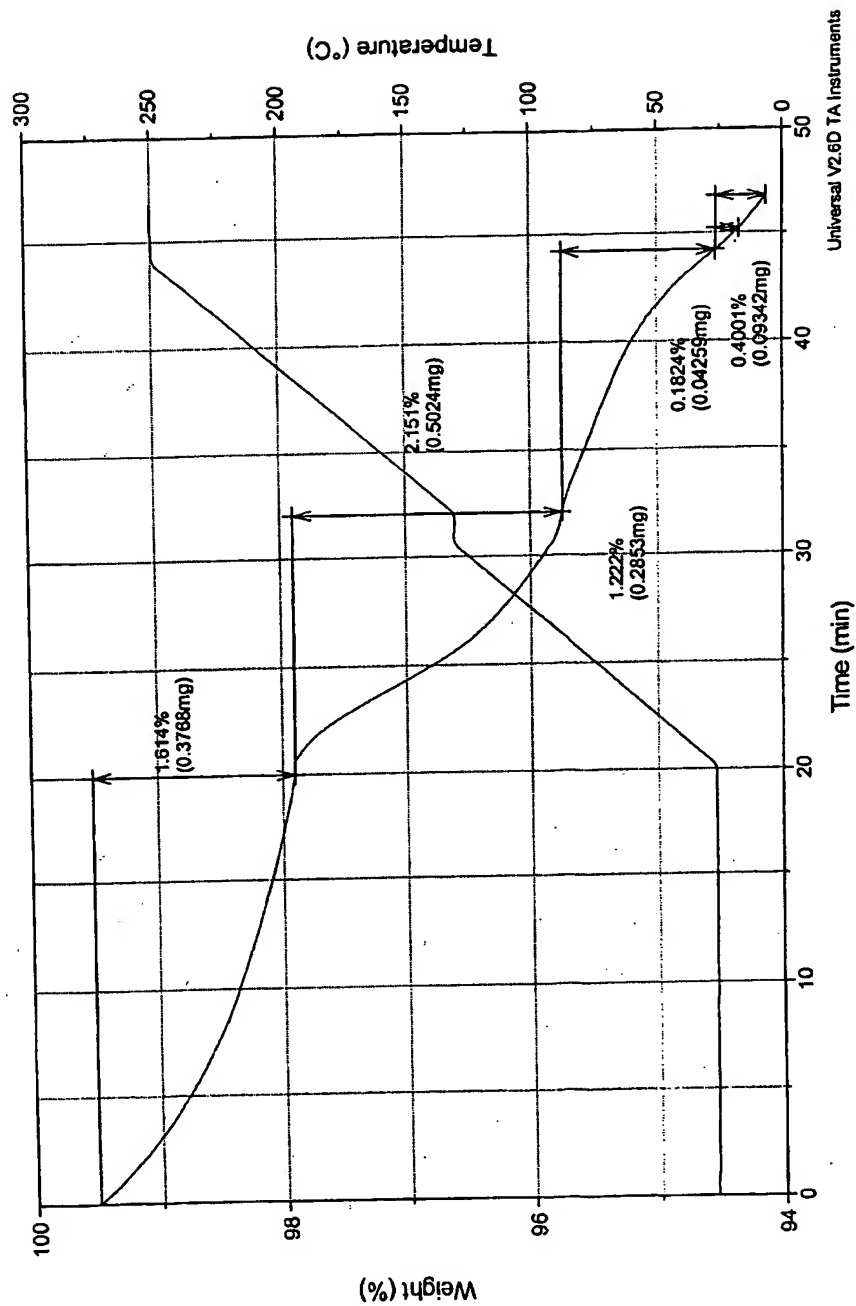


Figure 3

# TGA



Universal V2.6D TA Instruments

Figure 4



# TGA

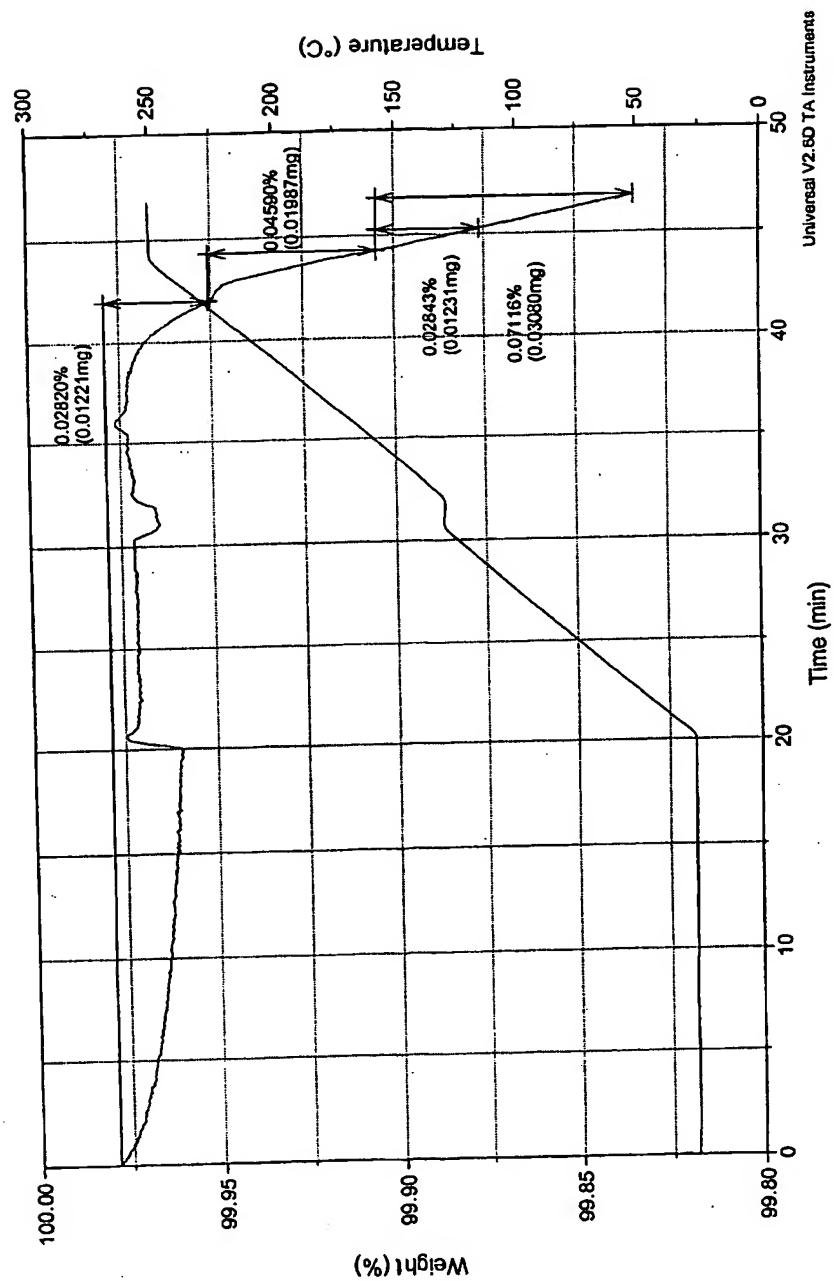


Figure 5

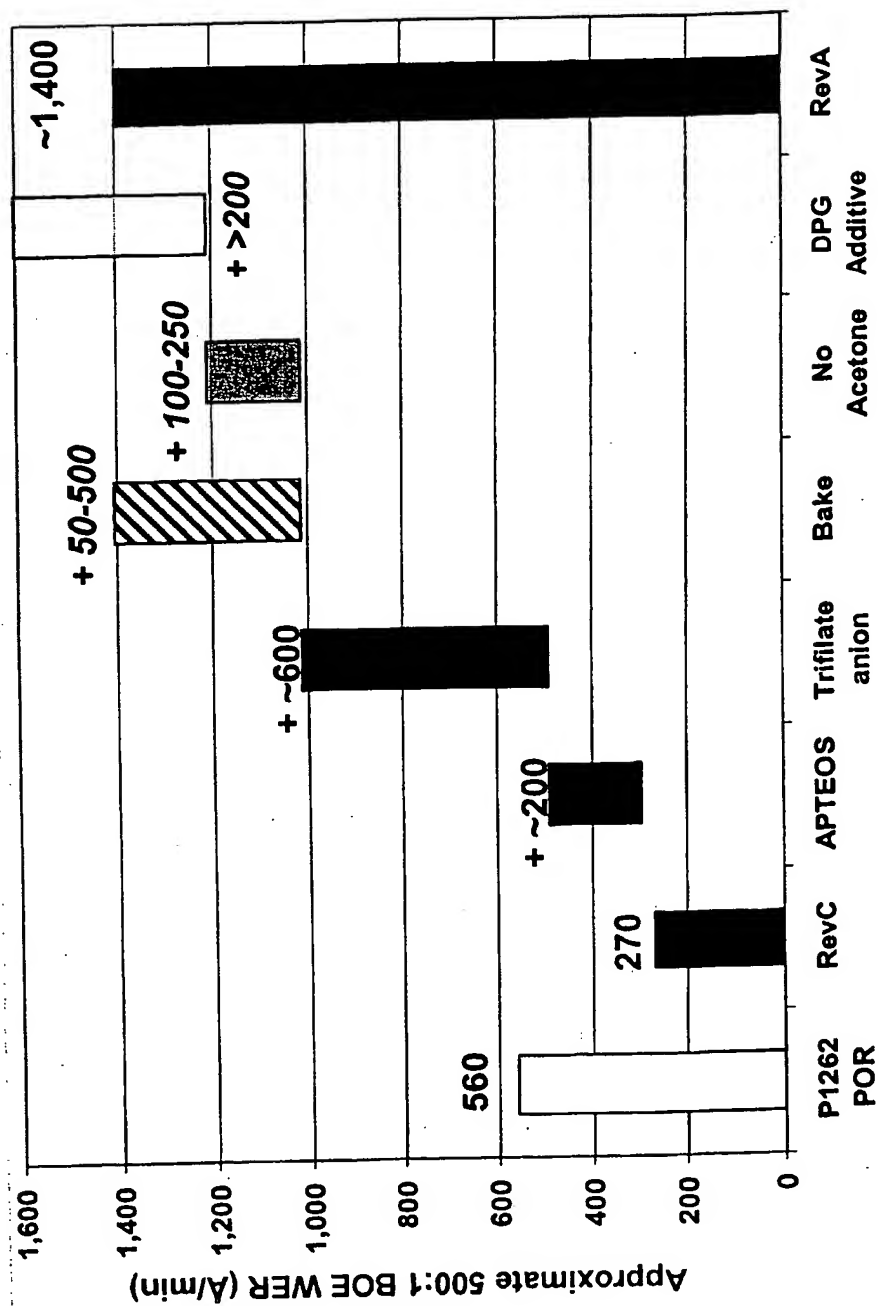


Figure 6

Figure 7

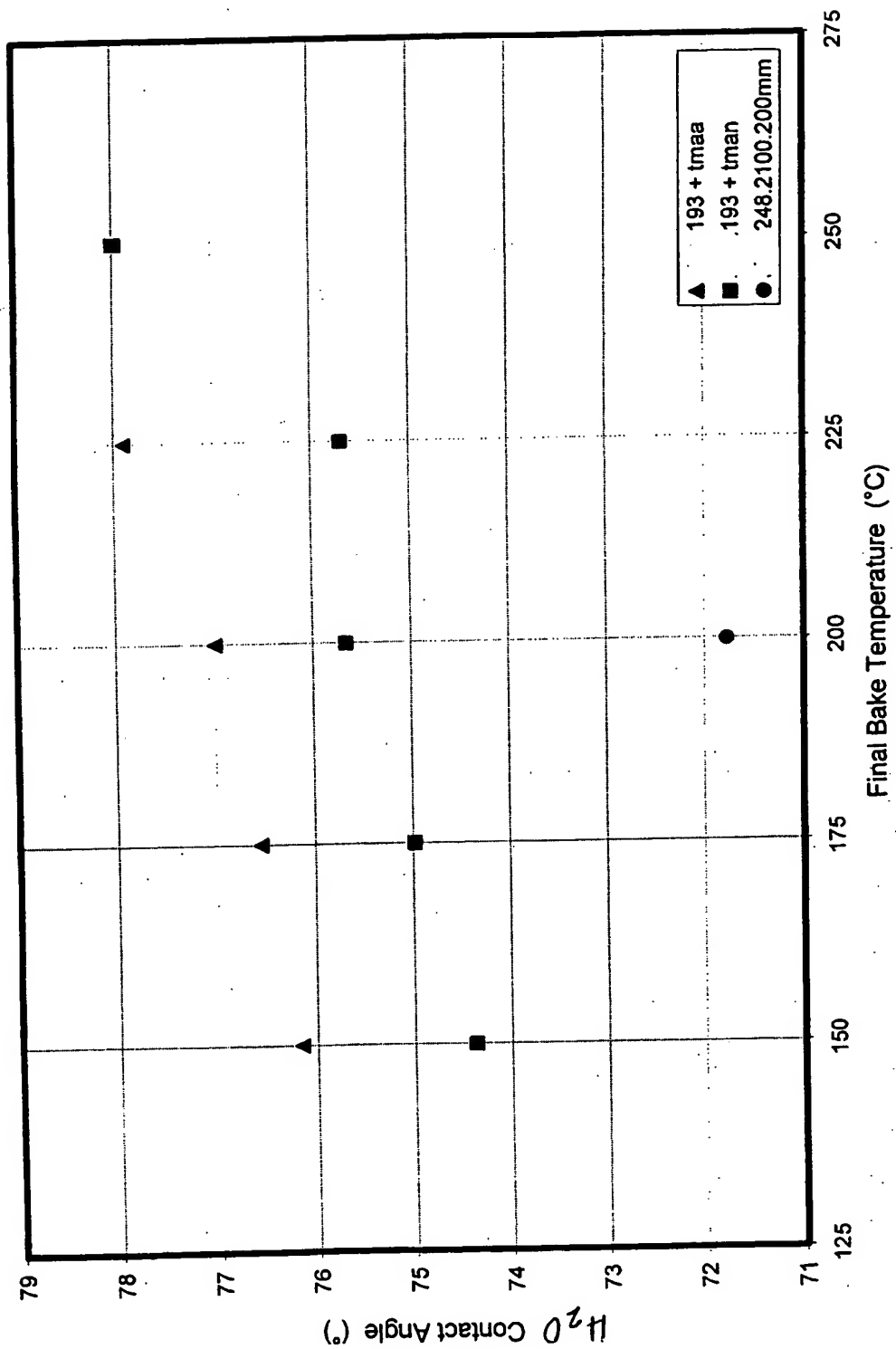
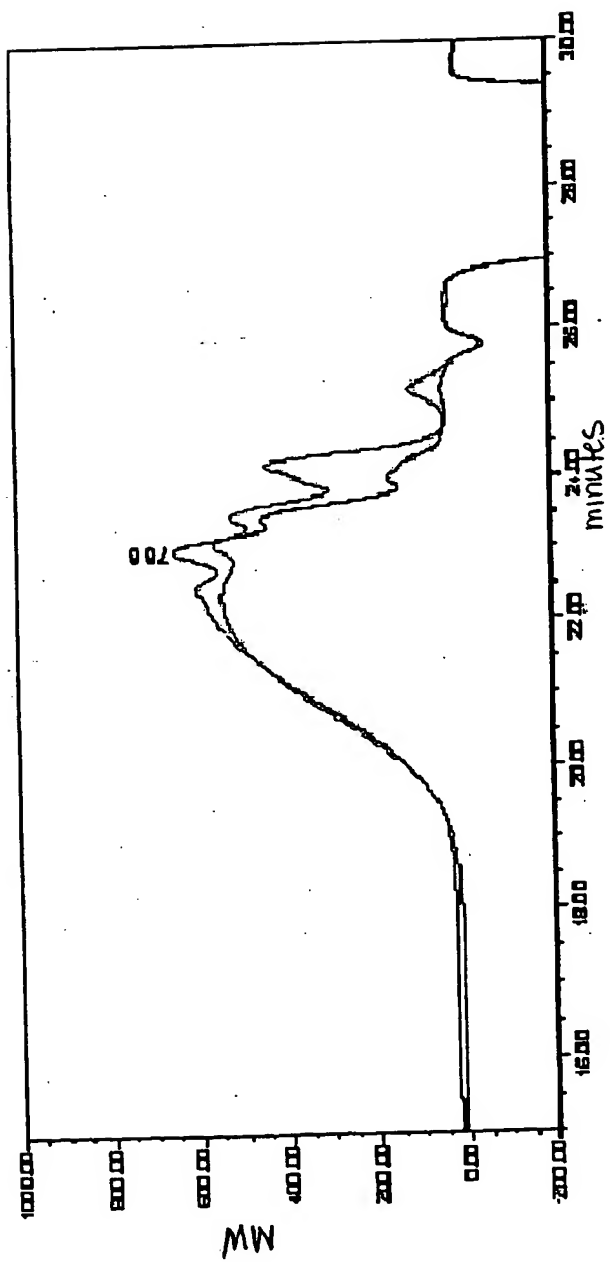


Figure 8



Product (Absorb. Comp.)	Mn	Mw	Mp	Mz	Mz+1	Polydispersity
193 + 600ppm Acidified TMAA	865	1183	737	1590	2012	1.367
w/ TMAA (after 5 days @ 40 C)	1021	1316	766	1671	2032	1.289
193 + 600ppm TMAN	789	1151	727	1582	1999	1.458
w/ TMAN (after 5 days @ 40 C)	848	1244	731	1706	2139	1.467

Figure 10

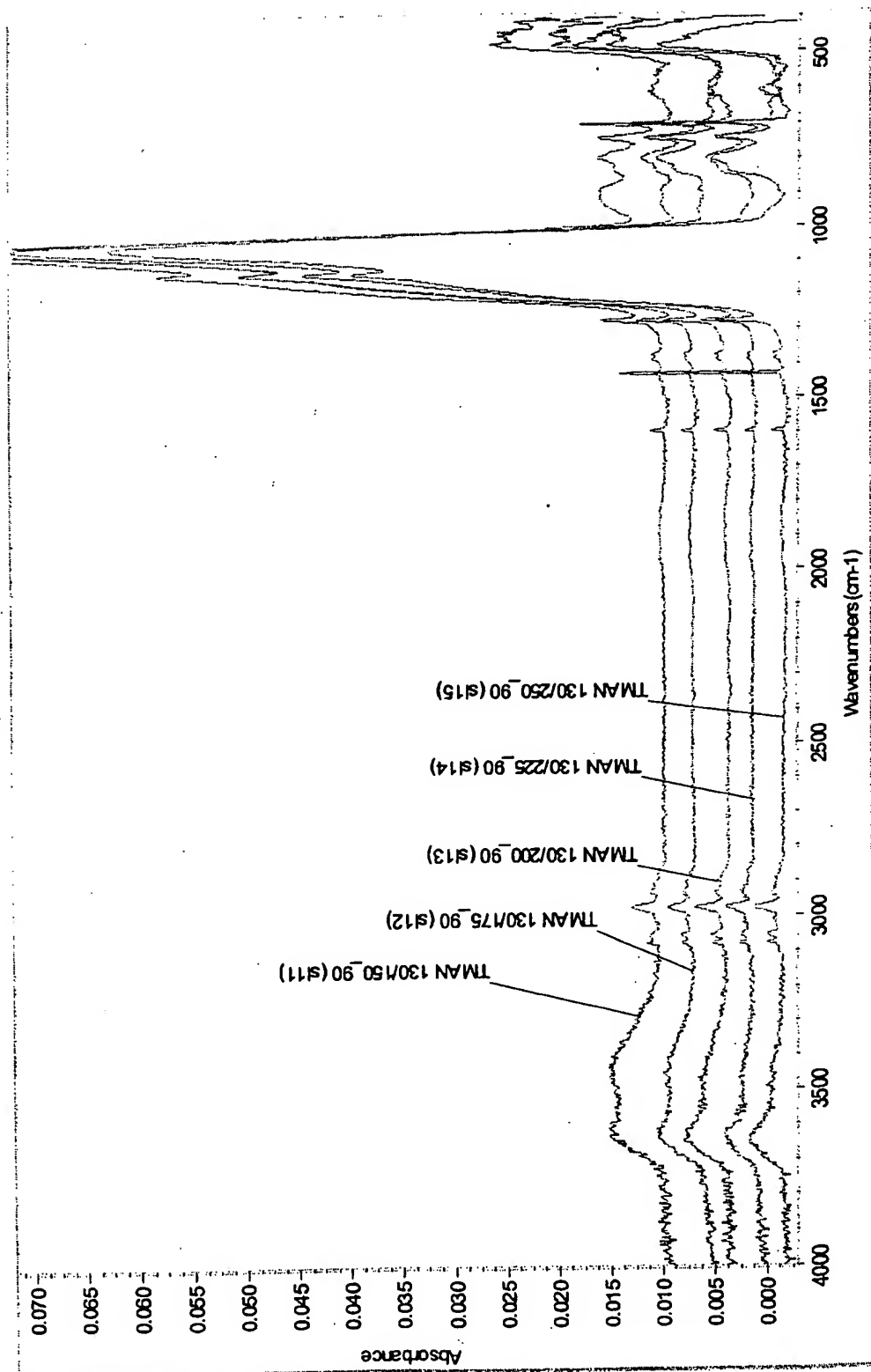


Figure 11

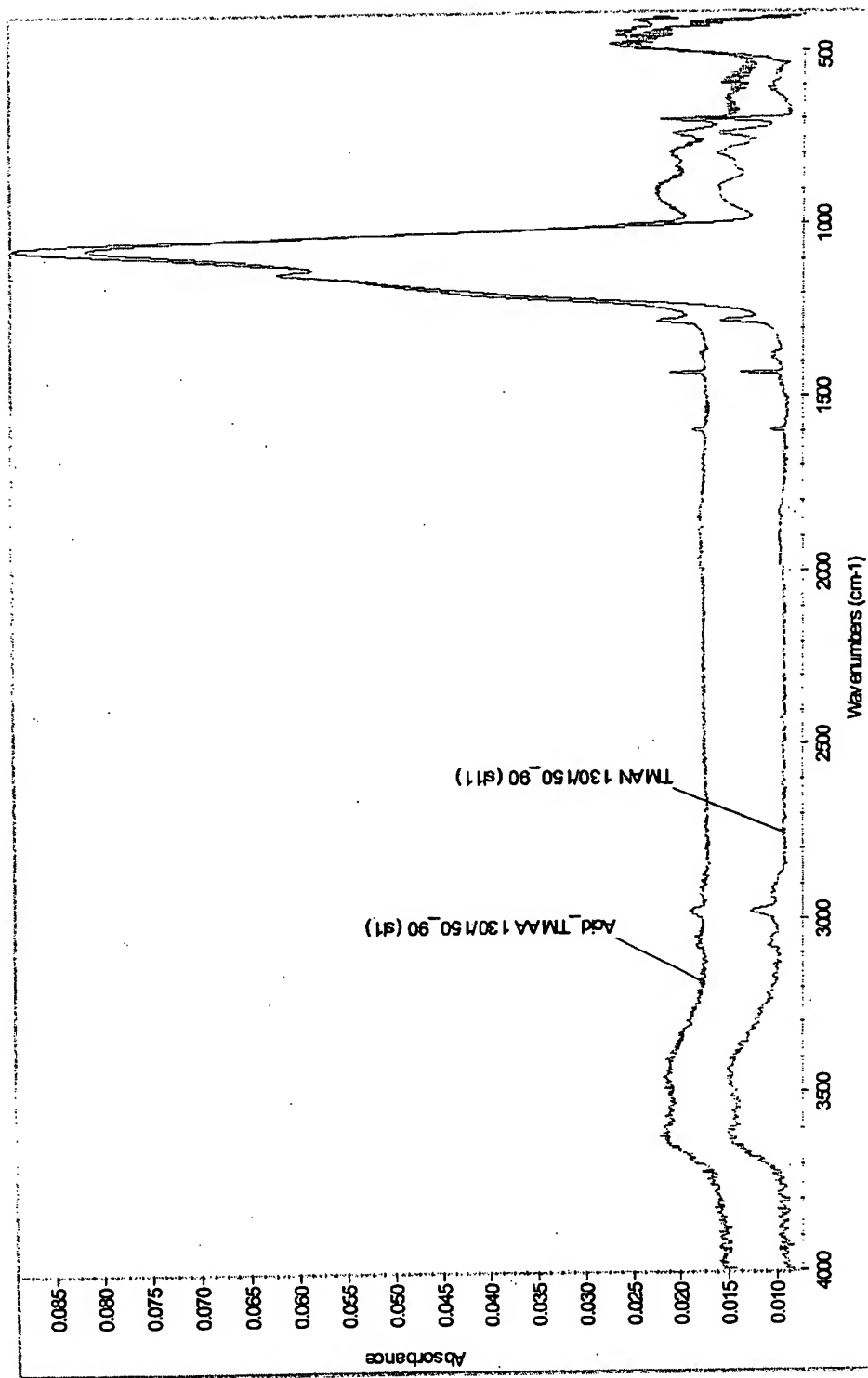


Figure 12

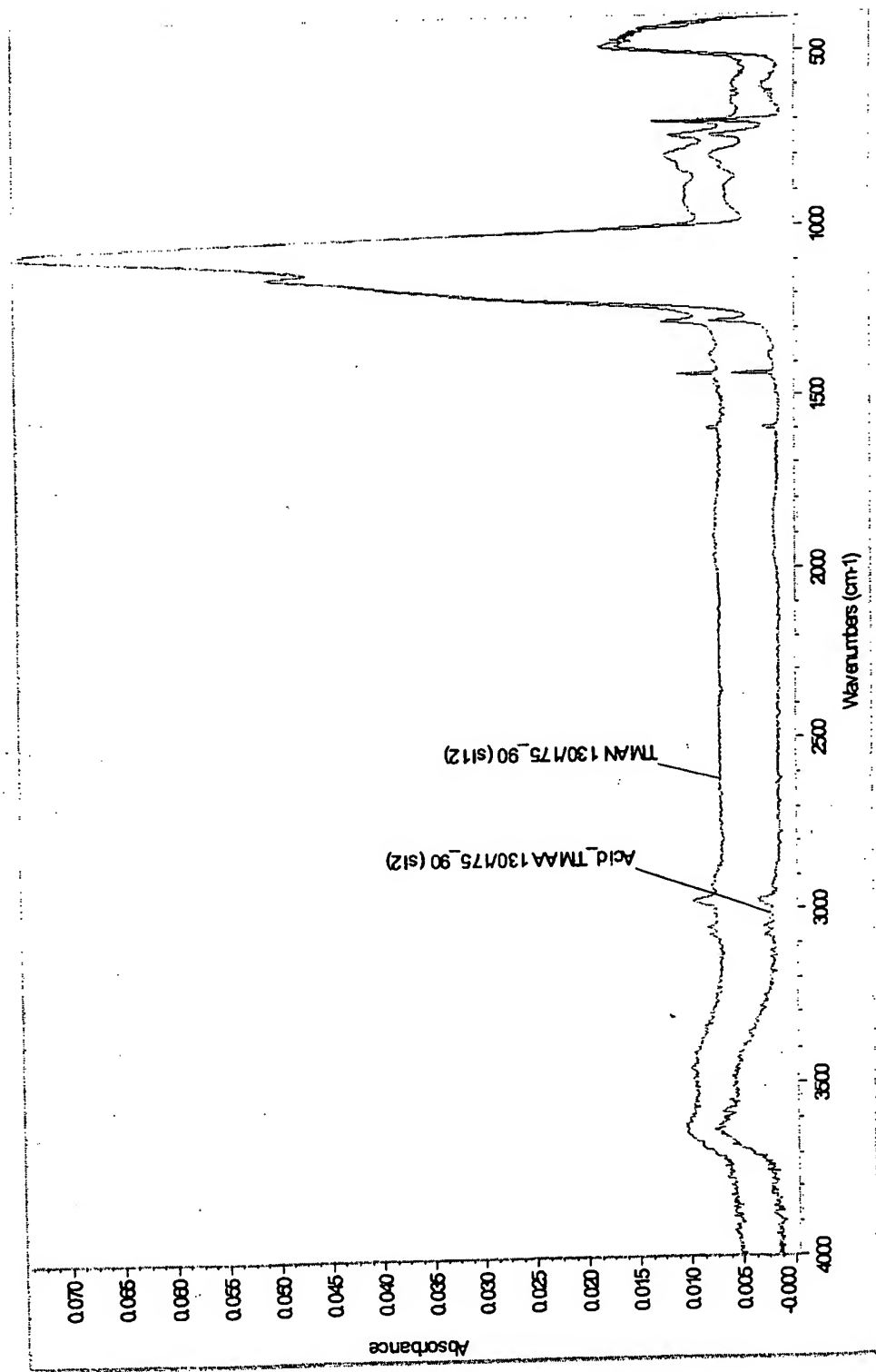


Figure 13

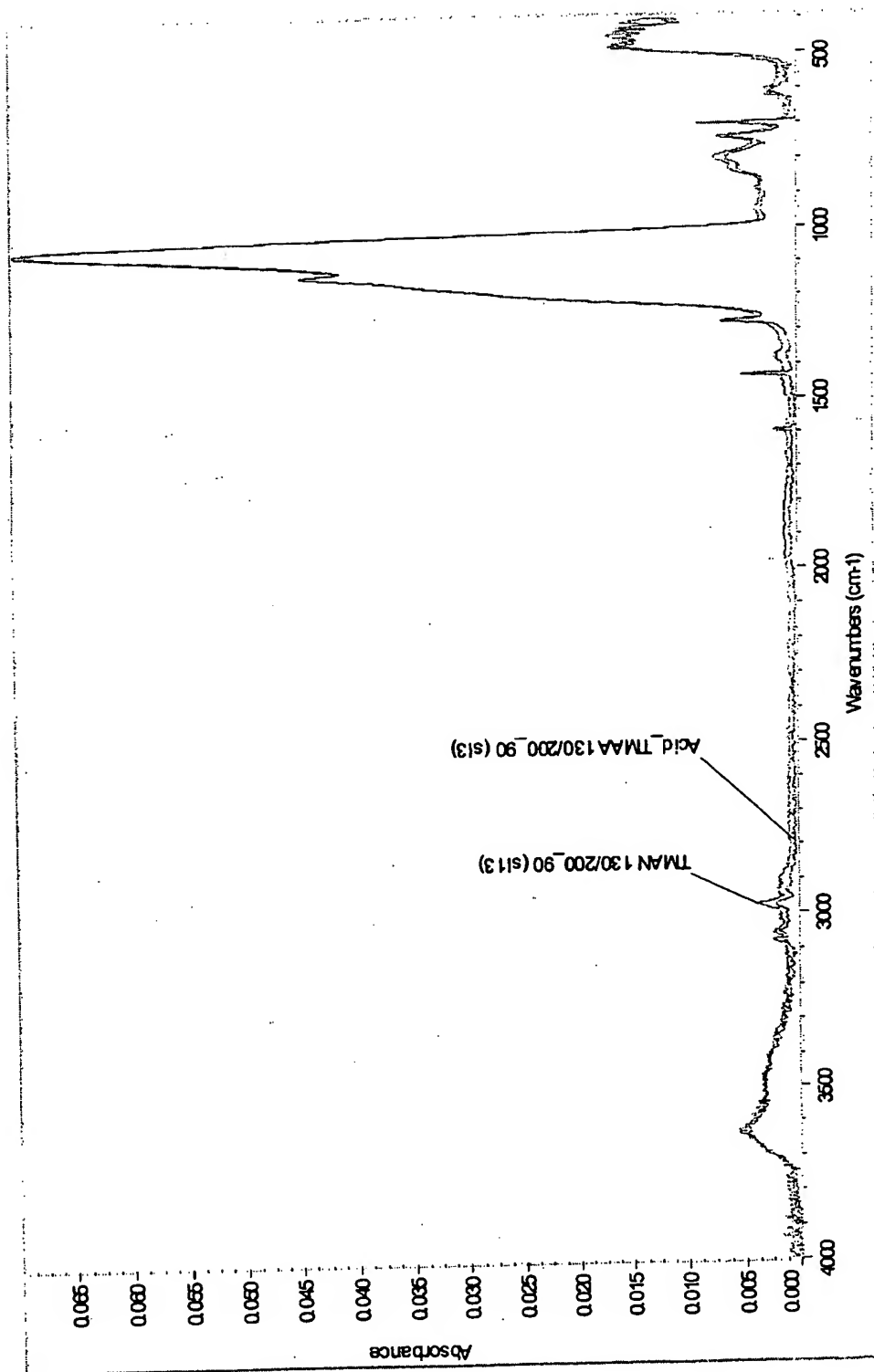




Figure 14

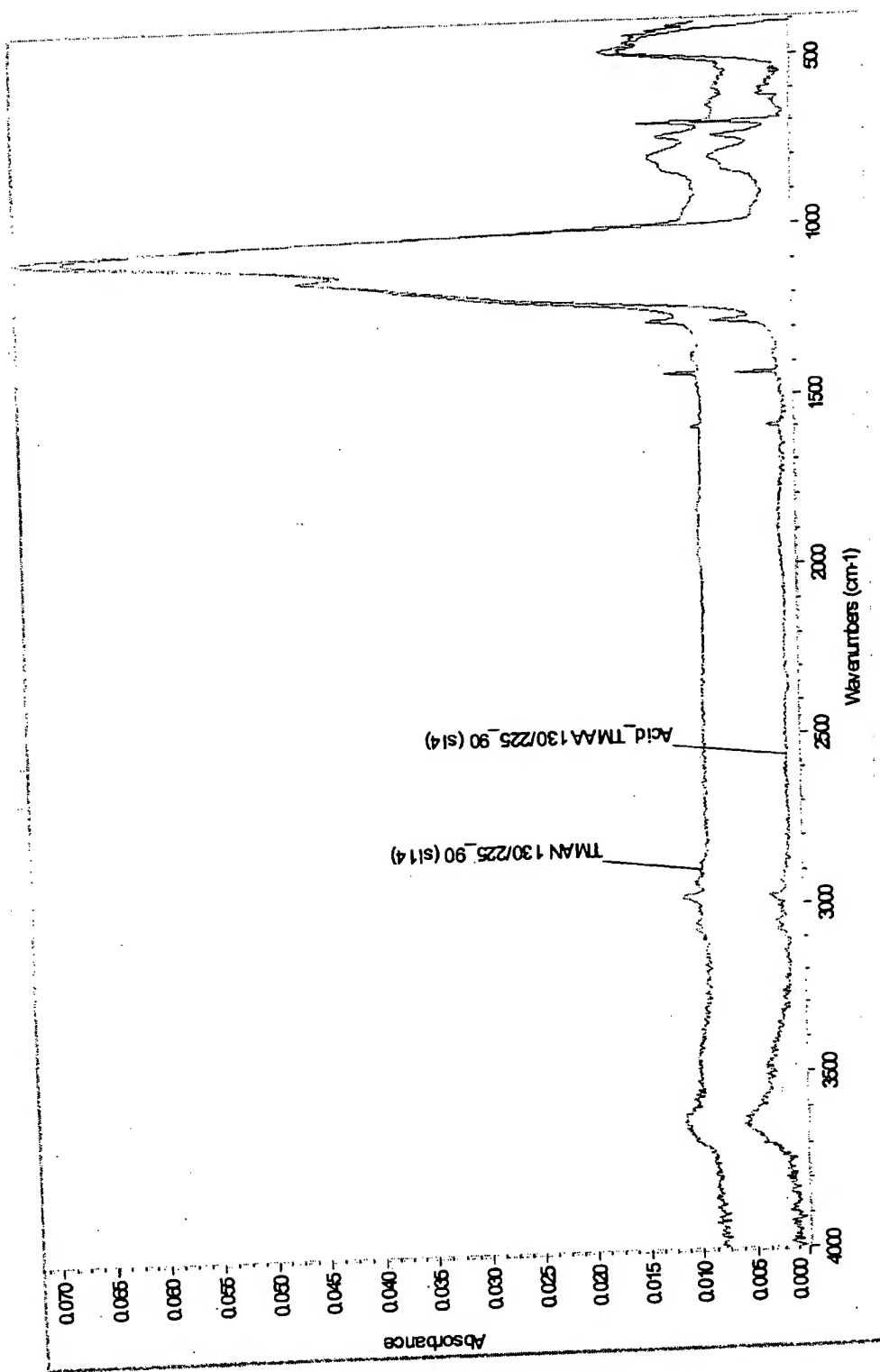
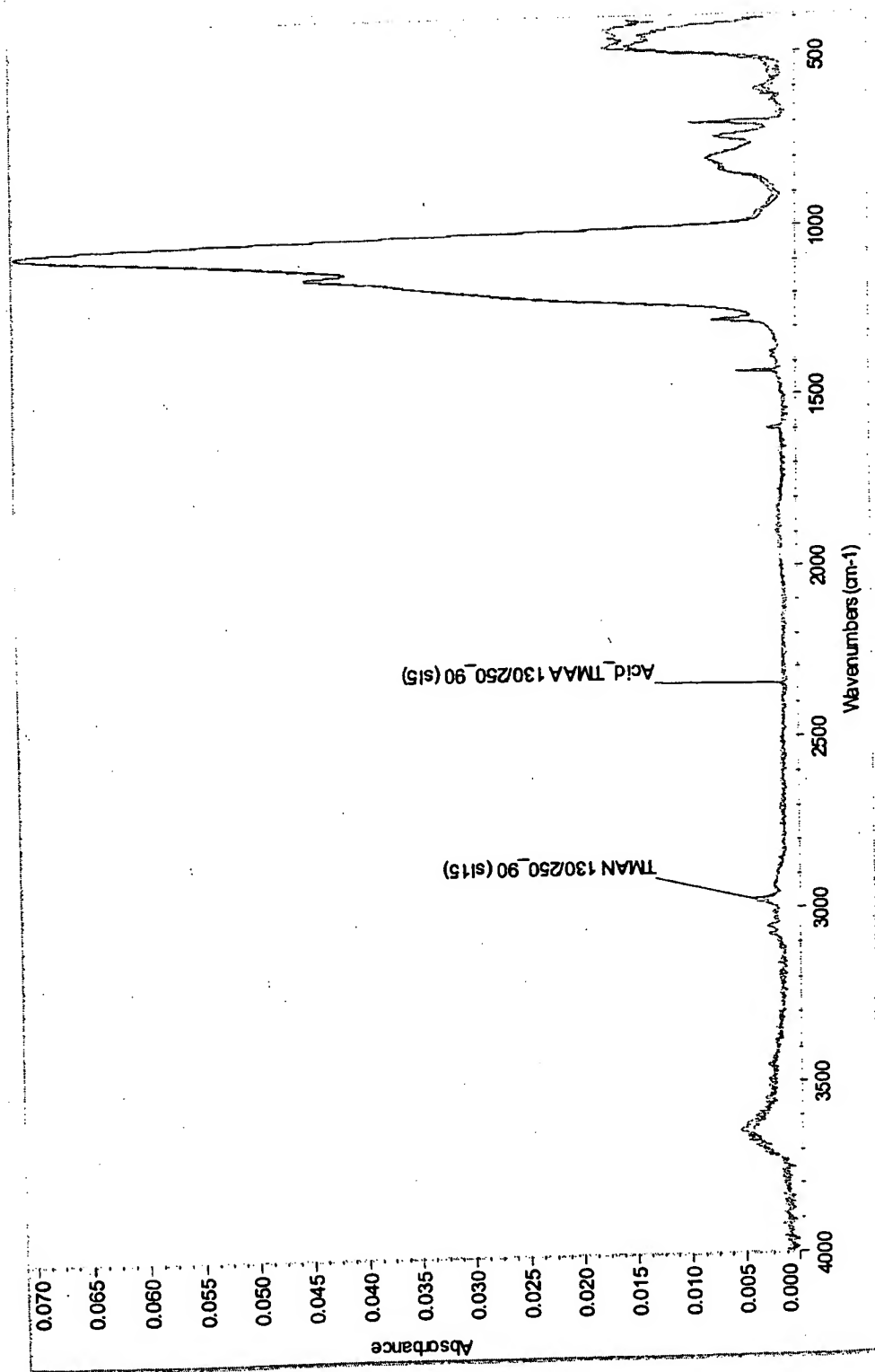


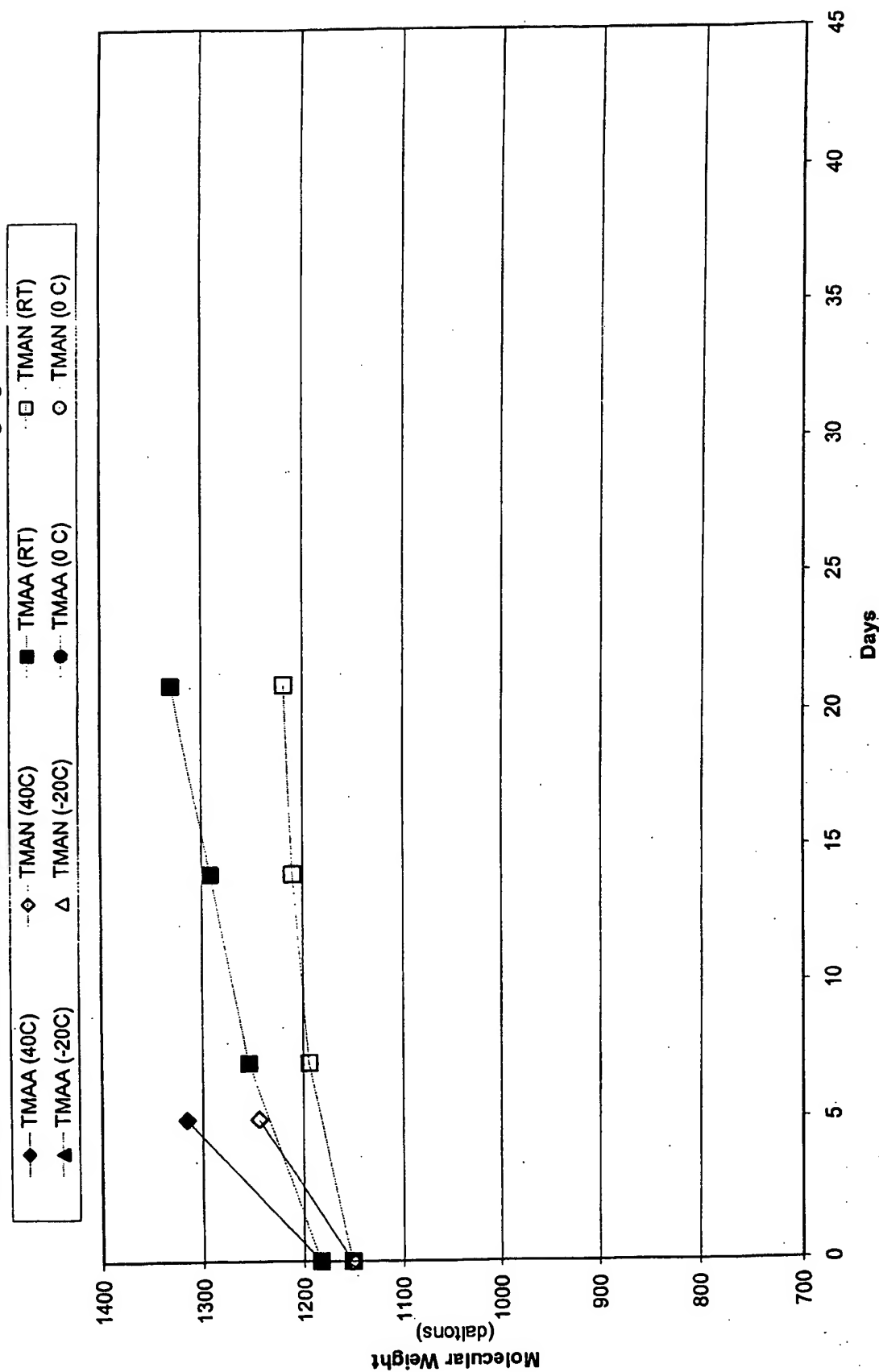
Figure 15



# Figure 16

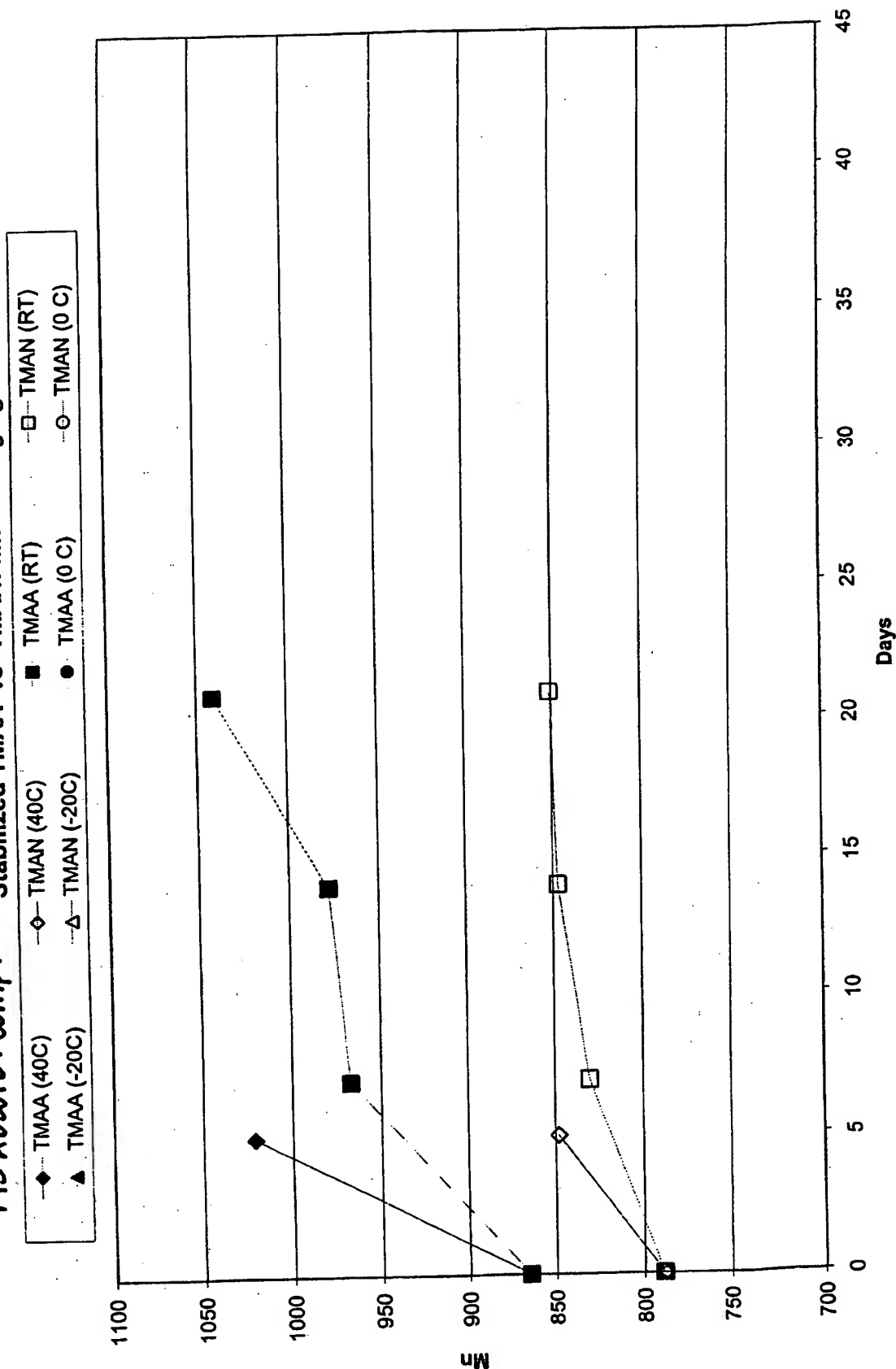
193 Absorb. Composition

### Stabilized TMAA -vs- TMAN: Mw -vs- Aging



# Figure 17

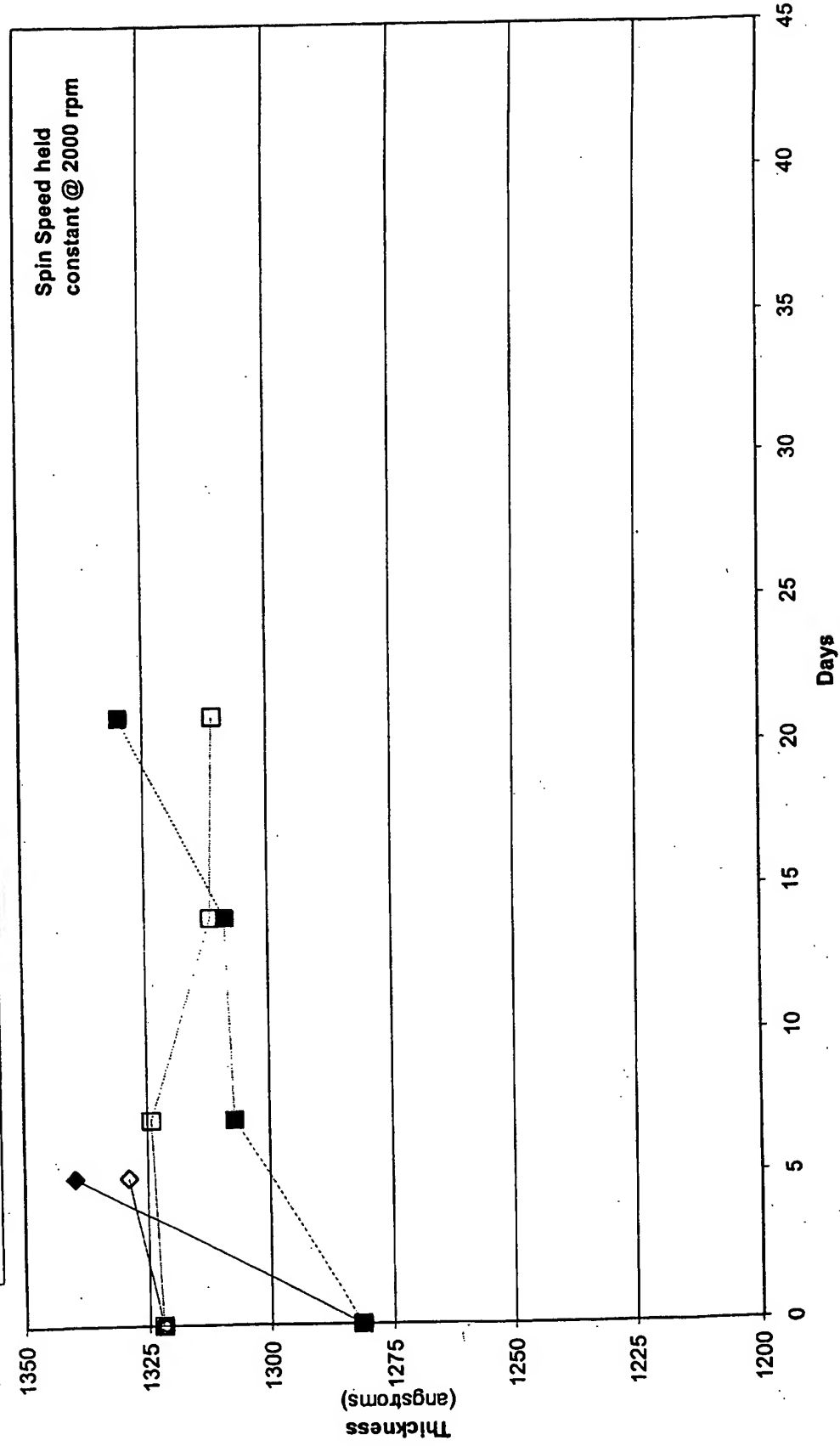
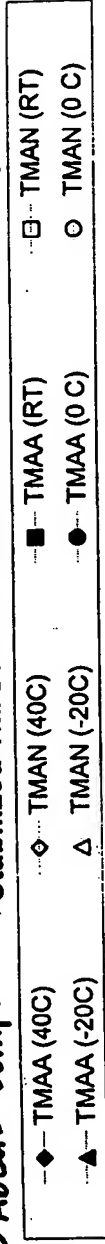
193 Absorb. Comp. Stabilized TMAA -vs- TMAN: Mn -vs- Aging



# Figure 18

193 Absorb. Comp.

Stabilized TMAA -vs- TMAN: Film Thickness -vs- Aging

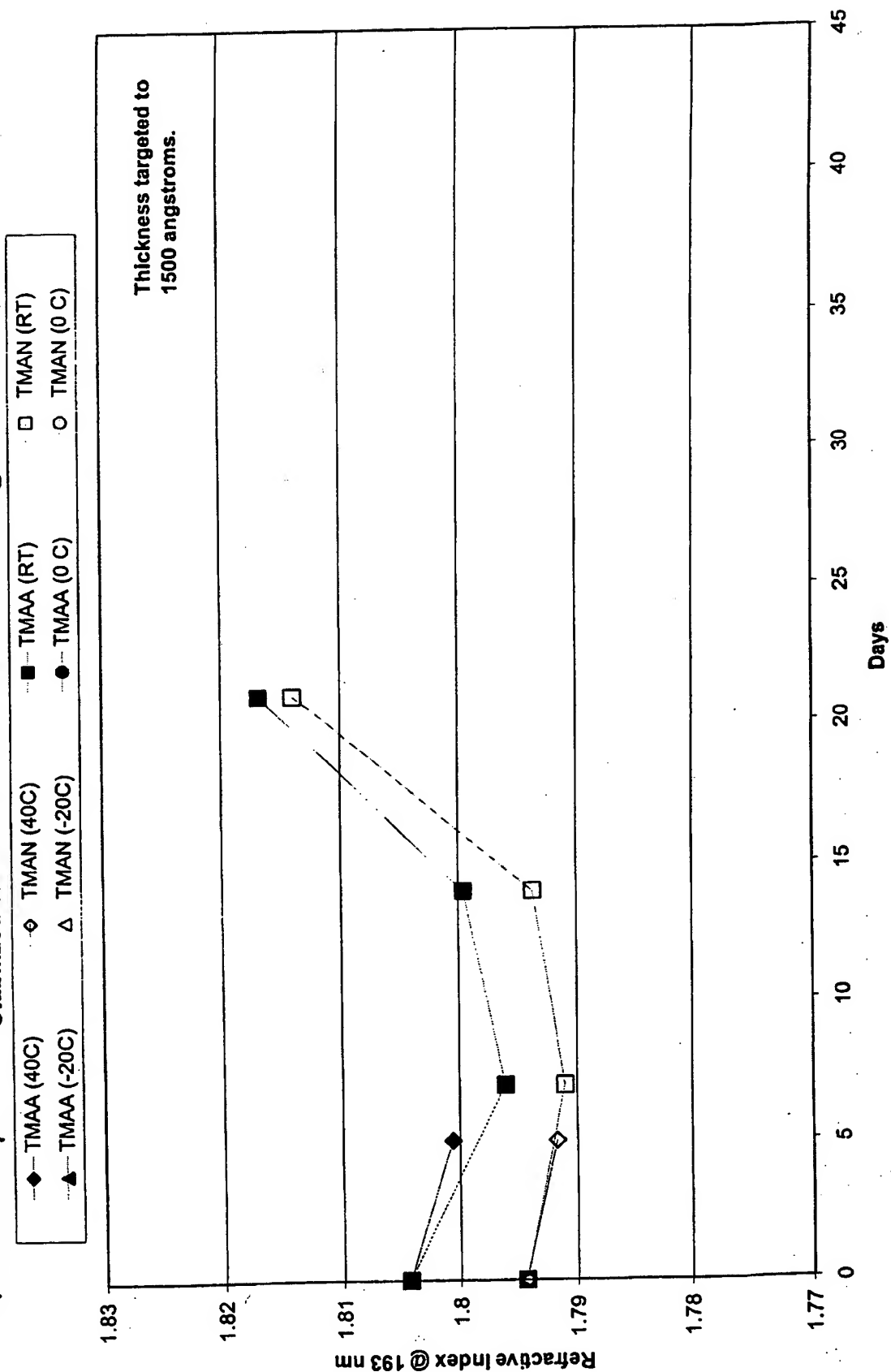




# Figure 20

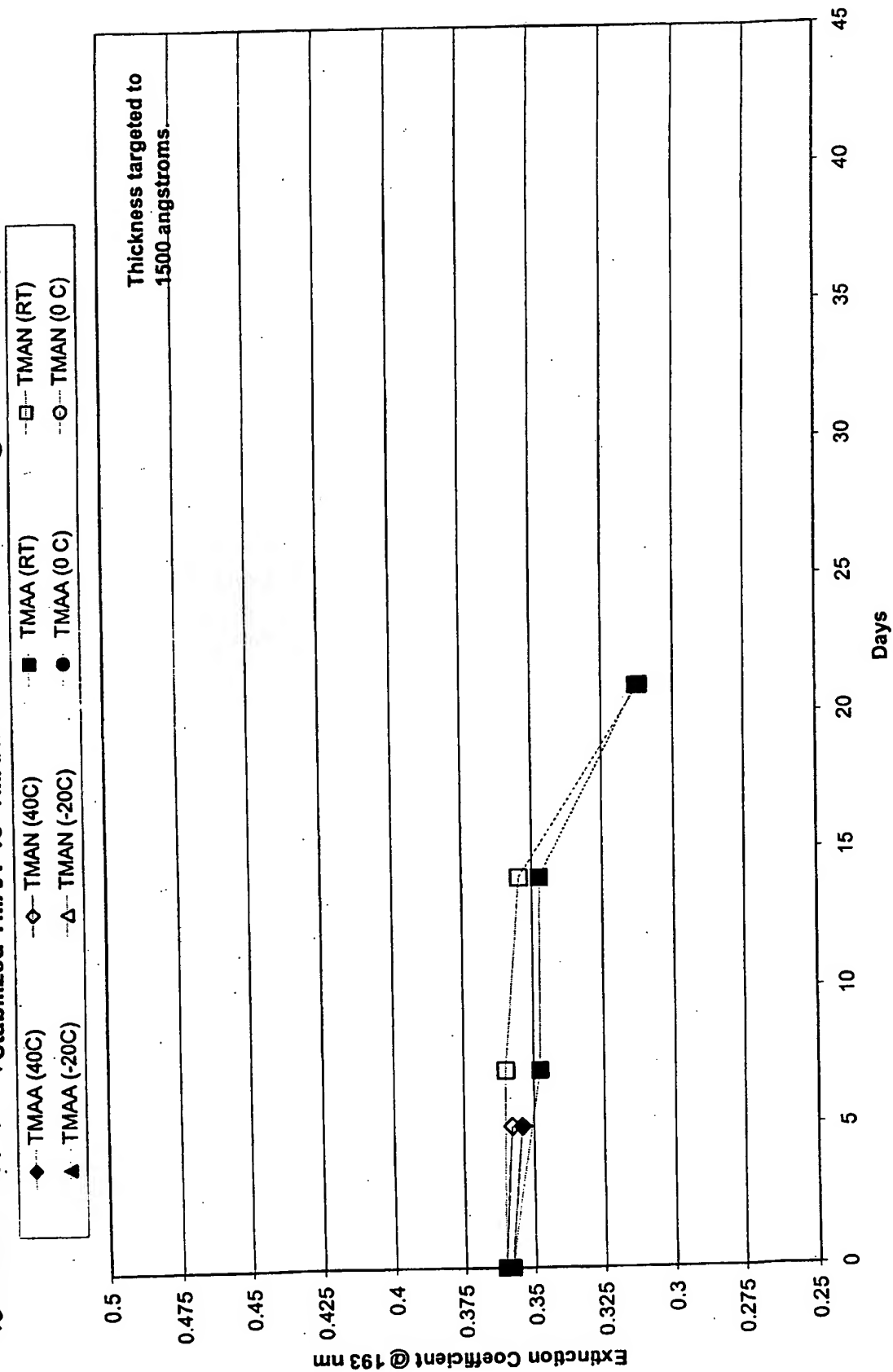
193 Abs. Comp.

### Stabilized TMAA -vs- TMAN: Refractive Index @ 193nm -vs- Aging



# Figure 21

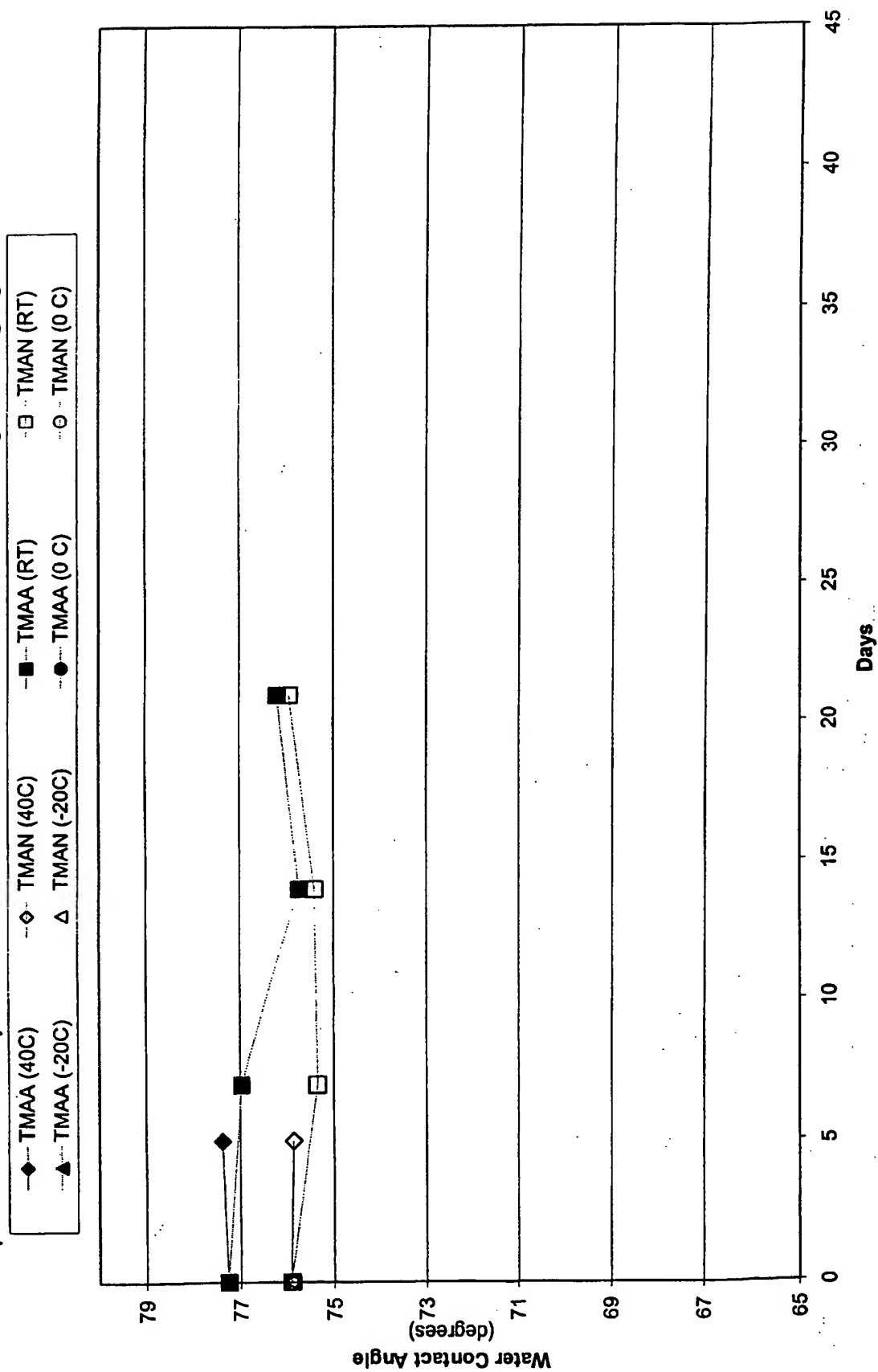
193 Absorb. Comp. : Stabilized TMAA -vs- TMAN: Extinction Coefficient @ 193nm -vs- Aging





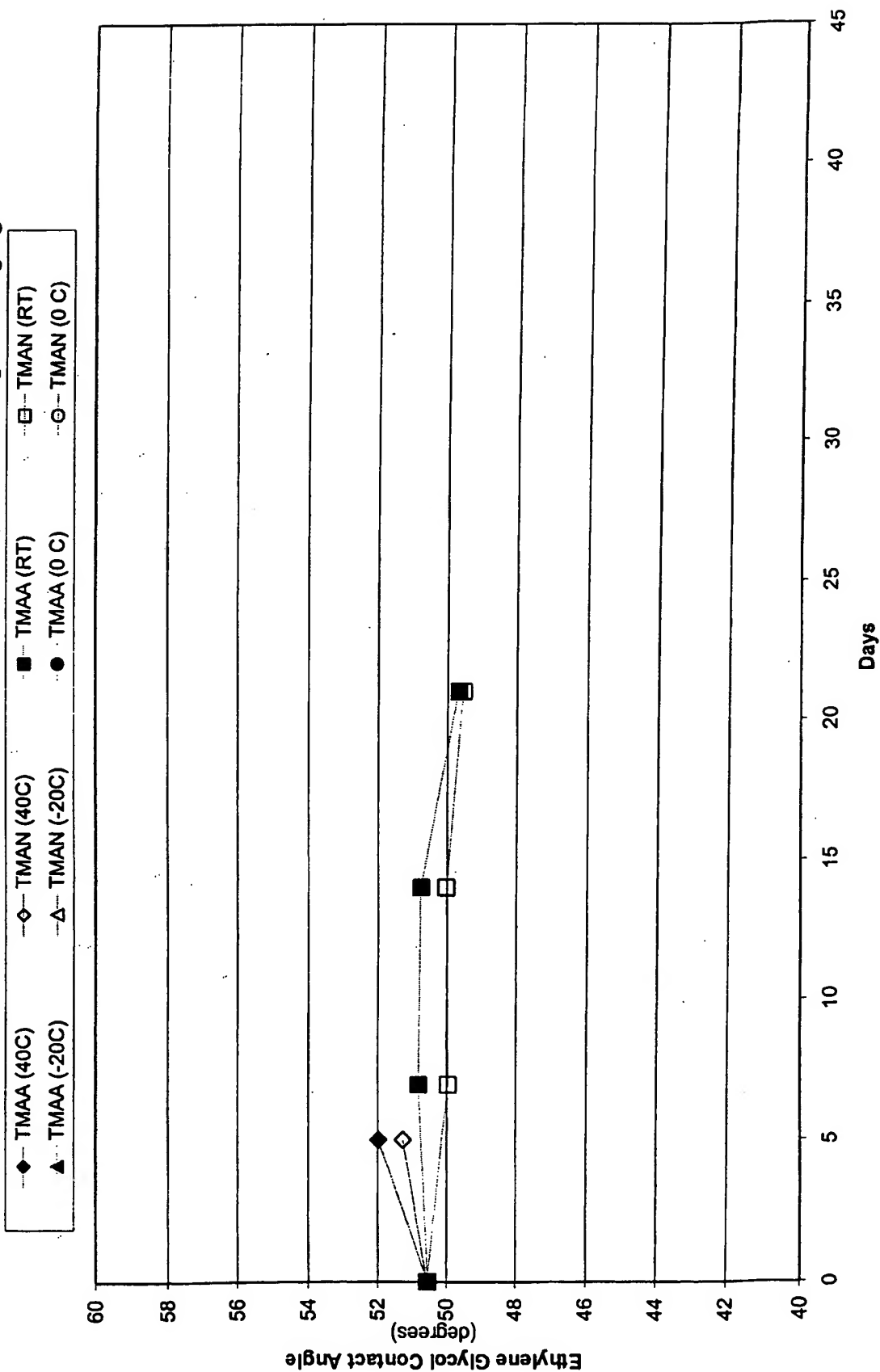
## Figure 22

**103 Absorb. Comp.      Stabilized TMAA -vs- TMAN: Water Contact Angle -vs- Aging**



# Figure 23

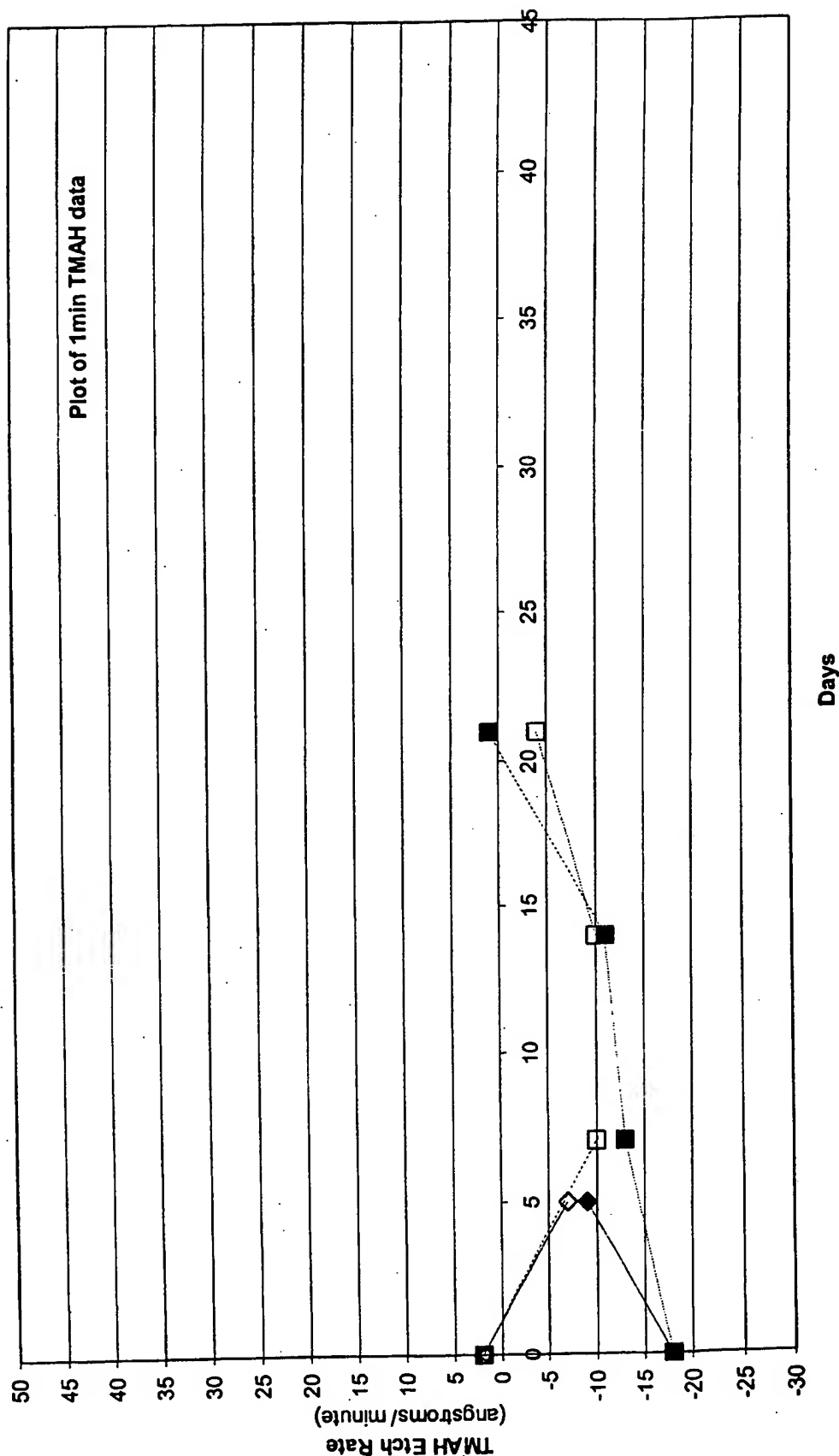
19b Abs. Comp.      Stabilized TMAA -vs- TMAN: Ethylene Glycol Contact Angle -vs- Aging



# Figure 24

193 Abs. Comp.

Stabilized TMAA -vs- TMAN: TMAH Resistance -vs- Aging



# Figure 25

193 Abs. Comp. Stabilized TMAA -vs- TMAN: 500:1 BOE strip rate -vs- Aging

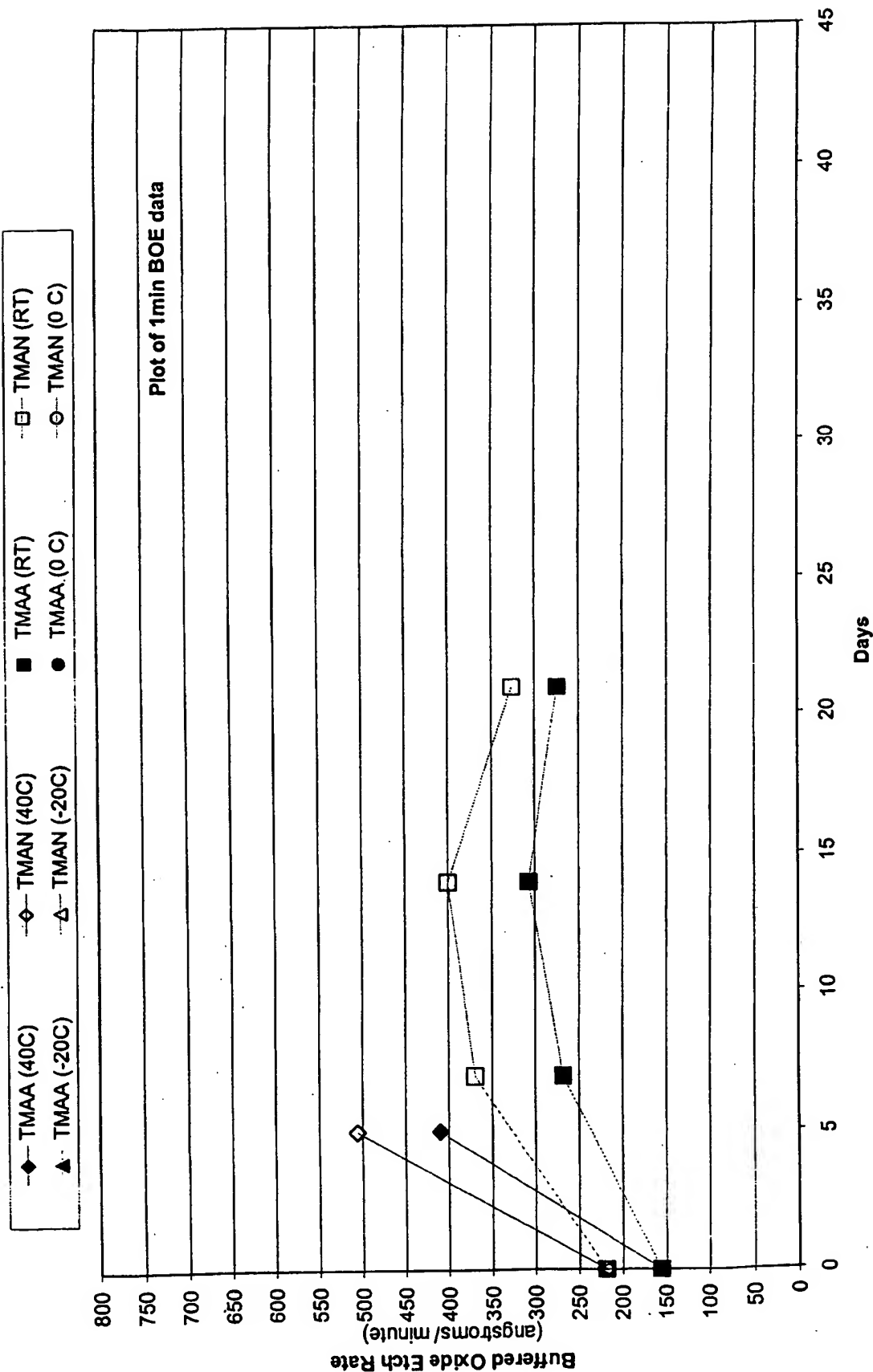


Figure 26

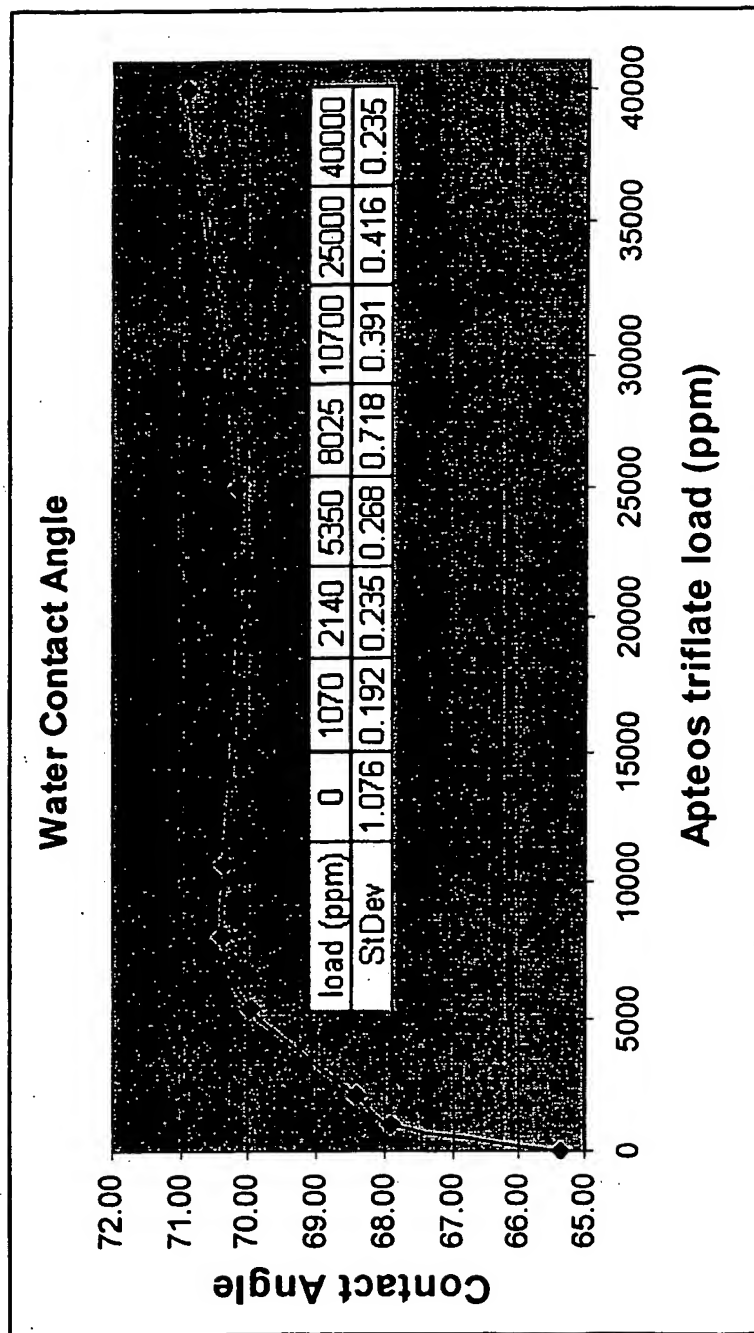
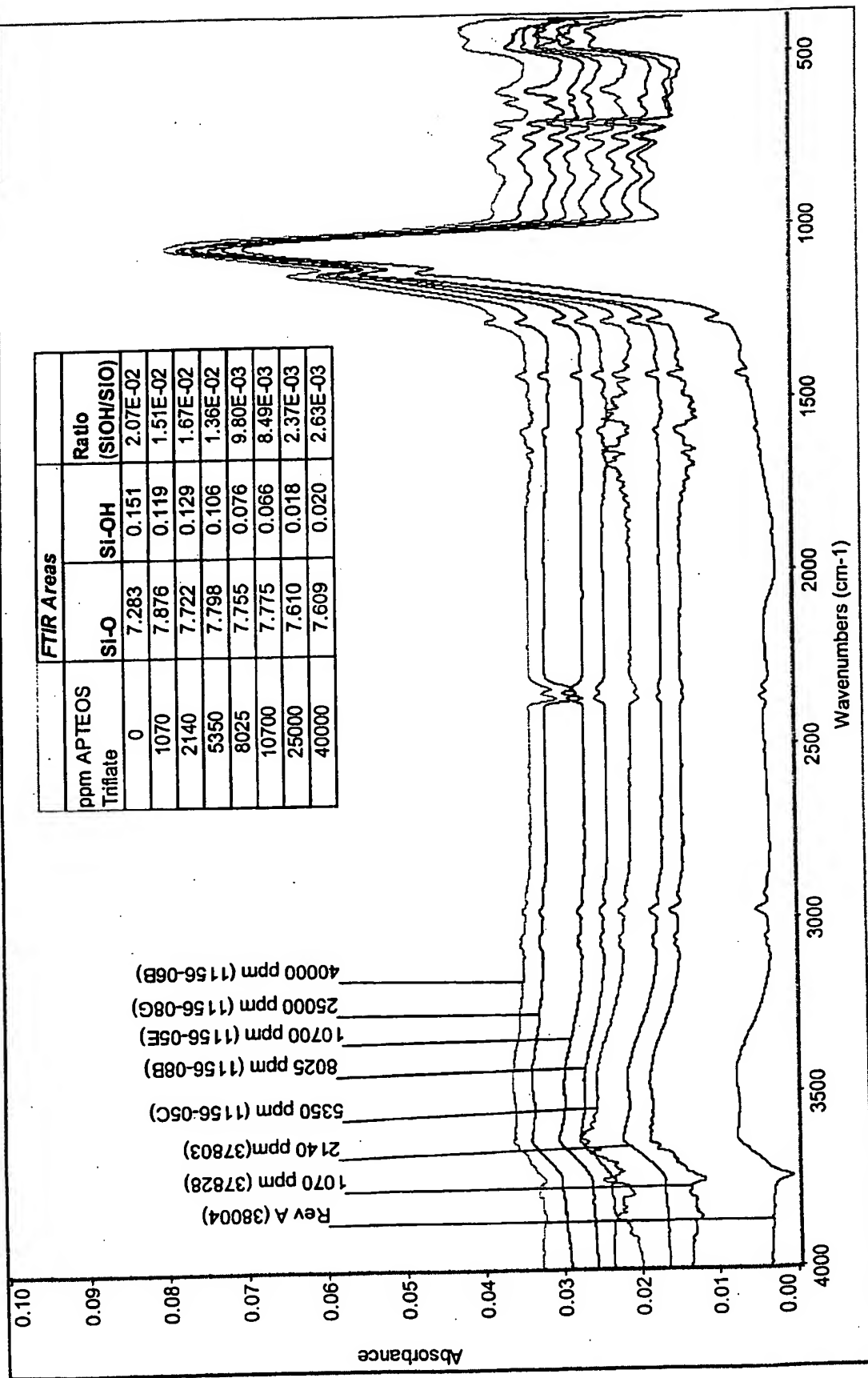


Figure 27



[

Description	248 Absorb. Composition		193 Absorb. Comp. POR		193 Absorb. Comp. Rev A		193 Absorb. Comp. Rev C		193 Absorb. Comp. Rev C (no acetone) + 5% DPG		193 Absorb. Comp. + 383ppm TMAH triflate		193 Absorb. Comp. + 1070ppm APTEOS triflate		193 AC. + 383ppm TMAH triflate + 3% DPG					
	130/200°C		150/250°C		130/200°C		130/200°C		130/200°C		130/240°C		130/240°C		130/240°C					
	50 sec each		50 sec each		50 sec each		50 sec each		50 sec each		50 sec each		50 sec each		50 sec each					
Bake Sequence	30 sec		1 min		2 min		1 min @		23°C		50°C		75°C		23°C		50°C		75°C	
	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
	1224																			
500:1BOE @ 21°C	1000		560																	
TMAH	3529																			
	3534																			
	3496																			
2.3% aq. TMAH	3526																			
	3487																			
	3530																			
5.0% aq. TMAH	3497																			
	3525																			
	3519																			

Table 4

Description		248 Absorbing Comp.		193 Absorbing Comp.		193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.		+1070ppm APTEOS triflate + 1.6%DPG	
pH		N/A		<1		<1		<1		<1		<1	
Bake Sequence		130/200 C		130/160 C		130/160 C		130/200 C		130/240 C		130/200 C	
		50 sec											
500:1 BOE	1 min @ 20 °C	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
		3533	[1741]	1676	[1631]	2741	[1631]	2724	[1631]	2737	[1025]	3211	[1032]
2.3% aq. TMAH	1 min @ 23 °C	3527		1690		2720		2747		2710		3172	
	50 °C	3524	[572]	1676		2722		2729		2713		3199	[435]
	75 °C	3540	[585]	1676		2743	[1276]	2743		2692		3181	[3181]
6.0% aq. TMAH	23 °C	3534	[1489]	1681		2701		2722		2702		3179	[639]
	50 °C	3543	[2455]	1676		2709		2717		2705		3183	[515-1]
	75 °C	3527	[2551]	1687		2716	[272]	2713	[192]	2671	[160]	3166	[2165]
10.0% aq. TMAH	23 °C	3539		1690		2734		2741		2716		3201	[115-2]
	50 °C	3532	[3552]	1682		2736	[269]	2749	[224]	2731	[168]	3173	[3173]
	75 °C	3533	[3553]	1674	[109]	2701	[515]	2726	[618]	2731	[394]	3166	[3166]



Table 5

		193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.			
Description		+1070ppm APTEOS triflate + 1.5%DPG		+1070ppm APTEOS triflate + 3%DPG		+1070ppm APTEOS triflate + 3%DPG		170ppm Ammonium Triflate		170ppm Ammonium Triflate + 3% DPG		170ppm Ammonium Triflate + 3% DPG	
pH		<1		<1		<1		<1		<1		<1	
Bake Sequence		130/240 C		130/200 C		130/240 C		130/200 C		130/200 C		130/240 C	
90s													
500:1 BOE	1 min @	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
	20°C	3214	[1152]	3507	[1175]	3548	[1153]	2751	[1115]	2971	[1115]	2982	[11459]
2.3% aq. TMAH	1 min @	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
	23°C	3218	[123]	3523	[123]	3564	[123]	2732	[123]	2951	[123]	2972	[123]
	50°C	3184	[115]	3610	[115]	3529	[115]	2746	[115]	2997	[115]	2960	[115]
6.0% aq. TMAH	75°C	3202	[115]	3505	[115]	3519	[115]	2736	[115]	2977	[115]	2992	[115]
	23°C	3194	[102]	3633	[102]	3519	[102]	2744	[102]	2972	[102]	2962	[102]
	50°C	3175	[102]	3505	[102]	3479	[102]	2725	[102]	2983	[102]	2943	[102]
10.0% aq. TMAH	75°C	3166	[102]	3496	[102]	3487	[102]	2750	[102]	2973	[102]	2953	[102]
	23°C	3200	[592]	3563	[592]	3496	[592]	2702	[592]	2979	[592]	2949	[592]
	50°C	3176	[592]	3504	[592]	3496	[592]	2761	[592]	2983	[592]	2949	[592]
10.0% aq. TMAH	75°C	3187	[592]	3534	[592]	3500	[592]	2766	[592]	2986	[592]	2992	[592]

Table 6

248 Absorb.		193 Abs.		193 Absorb.		193 Absorb.		193 Abs.		193 Absorb.			
Comps.		Comp.		Comp.		Comp.		Comp.		Comp.			
Description		+1070ppm APTEOS Triflate + 0.5% DPG		+1070ppm "optimized" APTEOS Triflate + 1.5% DPG		+1070ppm "optimized" APTEOS Triflate + 0.25% DPG		+1070ppm "optimized" APTEOS Triflate + 0.5% DPG		+1070ppm "optimized" APTEOS Triflate + 1% DPG		+1070ppm "optimized" APTEOS Triflate + 1.5% DPG	
pH		N/A		<1		<2		<2		<2		<2	
Bake Sequence		130/200 C		130/200 C		130/200 C		130/200 C		130/200 C		130/200 C	
		50 sec		90 sec		90 sec		90 sec		90 sec		90 sec	
600:1 BOE	1 min @	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
	20 °C	3487	2869	3177	2879	2854	2902	2934	2907	2967	2947	2960	2958
2.3% aq. TMAH	1 min @	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
	23 °C	3492	2847	3190	2854	2893	2934	2887	2955	2960	2958	2984	735
	50 °C	3463	2886	3190	2893	2864	2885	2898	2927	2932	2973	3006	268
6.0% aq. TMAH	1 min @	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
	23 °C	3496	2893	3182	2863	2844	2910	2926	2927	2932	2973	3006	268
	50 °C	3520	2867	3189	2844	2850	2926	2927	2932	2973	2976	2984	268
10.0% aq. TMAH	1 min @	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
	23 °C	3499	2877	3187	2871	2885	2906	2897	2977	2942	2958	2976	268
	50 °C	3522	2848	3215	2899	2885	2906	2897	2977	2942	2958	2976	268
75 °C	3542	2851	3186	2885	2885	2906	2897	2977	2942	2958	2976	268	268

Table 7

193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.	
+ 170ppm Ammonium Triflate + 0.25% DPG		+ 170ppm Ammonium Triflate + 0.5% DPG		170ppm Ammonium Triflate + 1% DPG		383ppm TMAH-MSA		383ppm TMAH-MSA + 1.5% DPG		1070ppm APTEOS-MSA		1070ppm APTEOS-MSA + 1.5% DPG	
pH		<2		<2		<2		<2		<2		<2	
Bake Sequence		130/200 C		130/200 C		130/200 C		130/200 C		130/200 C		130/200 C	
		90 sec		90 sec		90 sec		90 sec		90 sec		90 sec	
500:1 BOE	1 min @ 20 °C	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
		2804	2830	2931	2823	2816	2839	2768	2835	2839	2839	2839	2839
		Pre	Pre	Pre	Pre	Pre	Pre	Pre	Pre	Pre	Pre	Pre	Pre
2.3% aq. TMAH	1 min @ 23 °C	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
		2786	2821	2924	2812	2828	2834	2777	2821	2834	2834	2834	2834
		2827	2835	2881	2769	2810	2831	2765	2765	2831	2831	2831	2831
5.0% aq. TMAH	1 min @ 50 °C	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
		2762	2854	2897	2755	2848	2812	2794	2809	2812	2812	2812	2812
		2777	2841	2883	2773	2811	2868	2821	2821	2868	2868	2868	2868
10.0% aq. TMAH	1 min @ 75 °C	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
		2785	2809	2937	2779	2824	2848	2763	2804	2848	2848	2848	2848
		2785	2809	2937	2779	2824	2848	2763	2804	2848	2848	2848	2848
10.0% aq. TMAH	1 min @ 23 °C	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
		2785	2809	2937	2779	2824	2848	2763	2804	2848	2848	2848	2848
		2785	2809	2937	2779	2824	2848	2763	2804	2848	2848	2848	2848
10.0% aq. TMAH	1 min @ 50 °C	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
		2785	2809	2937	2779	2824	2848	2763	2804	2848	2848	2848	2848
		2785	2809	2937	2779	2824	2848	2763	2804	2848	2848	2848	2848
10.0% aq. TMAH	1 min @ 75 °C	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
		2785	2809	2937	2779	2824	2848	2763	2804	2848	2848	2848	2848
		2785	2809	2937	2779	2824	2848	2763	2804	2848	2848	2848	2848

Table 8

Description		193 Absorb. Compos.	193 Absorb. Comp.	193 Absorb. Comp.	193 Absorb. Comp.	193 Absorb. Comp.	193 Absorb. Comp.	193 Absorb. Comp.	193 Absorb. Comp.
		2140ppm "optimized" APTEOS triflate + 0.16% DPG	2140ppm "optimized" APTEOS triflate + 0.26% DPG	+ 170ppm "optimized" Ammonium triflate + 0.76% DPG	+ 170ppm "optimized" Ammonium triflate + 1% DPG	+ 225ppm "optimized" Ammonium triflate + 0.76% DPG	+ 225ppm "optimized" Ammonium triflate + 1% DPG	+ 225ppm "optimized" Ammonium triflate + 1% DPG	+ 340ppm "optimized" Ammonium triflate + 1% DPG
pH		<2	<2	<2	<2	<2	<2	<2	<2
Bake Sequence		90 sec		90 sec		90 sec		90 sec	
500:1		Pre	ER	Pre	ER	Pre	ER	Pre	ER
BOE		2970	2933	2933	2696	2902	2938	2970	2935
TMAH		Pre	Pre	Pre	Pre	Pre	Pre	Pre	Pre
23°C		2995	2962	2905	2913	2920	2935	2949	2949
60°C		2965	2947	2929	2929	2908	2932	2961	2961
75°C		2970	2946	2914	2959	2941	2962	2998	2998
5.0% aq.		2959	2932	2905	2924	2936	2929	2960	2960
TMAH		2968	2942	2915	2914	2923	2980	2991	2991
75°C		2943	2983	2948	2932	2945	2940	2974	2974
10.0% aq.		2982	2937	2915	2944	2919	2962	2989	2989
TMAH		3012	2960	2934	2978	2909	2908	3008	3008
75°C		2966	2971	2879	2923	2932	2937	2972	2972

Table 9

248 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.		193 Absorb. Comp.	
1070ppm "optimized" APTEOS triflate + 0% DPG		1070ppm "optimized" APTEOS triflate + 0.08% DPG		1070ppm "optimized" APTEOS triflate + 0.16% DPG		1070ppm "optimized" APTEOS triflate + 0.26% DPG		+ 1600ppm "optimized" APTEOS triflate + 0.08% DPG		+ 1600ppm "optimized" APTEOS triflate + 0.16% DPG		+ 1600ppm "optimized" APTEOS triflate + 0.26% DPG	
pH		N/A		<		<		<		<		<	
Bake Sequence		130/200 C		130/200 C		130/200 C		130/200 C		130/200 C		130/200 C	
		50 sec		90 sec		90 sec		90 sec		90 sec		90 sec	
Description	1 min @	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
		20°C	20°C	20°C	20°C	20°C	20°C	20°C	20°C	20°C	20°C	20°C	20°C
500:1 BOE	1 min @	3565	1019	2887	1331	2900	1358	2942	1454	2974	1659	2984	1659
TMAH	1 min @	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER	Pre	ER
2.3% aq. TMAH	23°C	3544	134	2866	134	2885	134	2921	134	2956	134	2909	134
	50°C	3551	803	2858	106	2894	142	2952	176	2933	2742	2984	249
	75°C	3598		2902	622	2925	833	2916		2992	193	2925	193
5.0% aq. TMAH	23°C	3559	3559	2861	3559	2901	101	2930		2941	100	2904	137
	50°C	3539	3539	2848	255	2874	339	2902	455	2970	588	2931	487
	75°C	3555	3555	2893	789	2912	1021	2941	1541	2927	1939	2952	1939
10.0% aq. TMAH	23°C	3563	3563	2850	3563	2892	192	2917	155	2956	226	2947	158
	50°C	3580	3580	2892	704	2870	851	2936	22	2977	1545	2918	158
	75°C	3545	3545	2893	1331	2886		2914	2241	2939	2333	2967	2333

248 Absorb. Composition		193 Absorb. Composition		193 Absorb. Composition		193 Absorb. Composition	
Descriptions		+ 1070ppm APTEOS tosylate		+ 1070ppm APTEOS tosylate		+ 1070ppm APTEOS tosylate + 5% DPG	
pH		1.5		<1		<1	
Bake temp. (C)/Time (Sec)		150/250C -- 50sec		130/240C -- 90sec		130/200C -- 90sec	
Metrics		ER (A/min)		ER (A/min)		ER (A/min)	
2.5% TMAH @ 21°C	1 min	210		12		10	
	2 min	167		12		4	
	30 sec	[224]		[240]		[880]	
500:1BOE @ 21°C	1 min	1000		[215]		845	
	2 min	[880]		>673		>689	
ER: Etch Rate (A/min);							
Pre: Pre-Immersion SOG Film Average Thickness in Angstrom;							
ER > 1000A/min.							
ER < 1000A/min.							
> Bare Si post-etch.							
[ ] Post-etch film is highly non-uniformed.							

Table 10



248 Absorb. Composition      193 Absorb. Composition

Descriptions			RevA + 383ppm TMAH triflate	RevA + 383ppm TMAH tosylate
pH		N/A	<1	<1
Bake temp. (C)/Time (Sec)		130/200C -- 50sec	130/240C -- 90sec	130/240C -- 90sec
Metrics		ER (A/min)	ER (A/min)	ER (A/min)
2.5% TMAH @ 21°C	1 min	210	11	16
	2 min	167	4	8
500:1BOE @ 21°C	30 sec	1224	969	689
	1 min	1000	844	647
	2 min	[880]	[854]	665
ER:	Etch Rate (A/min);			
Pre:	Pre-Immersion SOG Film Average Thickness in Angstrom;			
	ER > 1000A/min.			
	ER < 1000A/min.			
>	Bare Si post-etch.			
[ ]	Post-etch film is highly non-uniformed.			

Table II

**Table 12**

	"N" wt / Si comp. Wt (ppm)	"N" mole / Si comp. Wt (ppm)	"N" mole / Si comp. Wt (ppm) (consider 95% TMAA and 96% TMAN)
AS_TMAA	589	4.422	4.201
TMAN	601.2	4.416	4.239



Table 13

## 193 Absorbing Composition + TMAA

Bake temp. (C)/Time (Sec)	130/150C -- 90sec	130/175C -- 90sec	130/200C -- 90sec	130/225C -- 90sec	130/250C -- 90sec
Metrics	ER (A/min)	ER (A/min)	ER (A/min)	ER (A/min)	ER (A/min)
2.5% TMAH @ 21°C	1 min	5	7	2	3
PGMEA @ 21°C	6 min	0.4	0.4	0.2	0.9
500:1BOE @ 21°C	30 sec	358	261	206	165
	1 min	351	273	216	176

248  
Absorb.  
Comp.

## 193 Absorbing Comp. + TMAA

Bake temp. (C)/Time (Sec)	130/150C -- 90sec	130/175C -- 90sec	130/200C -- 90sec	130/225C -- 90sec	130/250C -- 90sec	130/200C -- 60sec
Metrics	ER (A/min)	ER (A/min)	ER (A/min)	ER (A/min)	ER (A/min)	ER (A/min)
2.5% TMAH @ 21°C	1 min	3	1	1	3	382
PGMEA @ 21°C	6 min	0.7	0.2	0.1	0.1	21
500:1BOE @ 21°C	30 sec	57	103	26	20	170
	1 min	56	103	312	18	385

Spin Coated @ 7PM on 5/22/03; Wet Process

# Table 14

193 Absorbing Composition 248 Abs. Comp.

Descriptions		+ 600ppm TMAN	+ 600ppm Stabilized TMAA	N/A
PH		1.7	0.5	130/200C -- 50sec
Bake temp. (C)/Time (Sec)		130/240C -- 90sec		
DI Water Contact Angle		78.7	78.9	74.9
Metrics		ER (A/m In)	ER (A/m In)	ER (A/m In)
2.5% TMAH @ 21°C	1 m In	-7	-9	45
	2 m In	-8	-10	47
	30 sec	263	277	785
500:1BOE @ 21°C	1 m In	506	410	937
	2 m In	413	366	720
DI Water Contact Angle		77.5	78	74.2
Metrics		ER (A/m In)	ER (A/m In)	ER (A/m In)
2.5% TMAH @ 21°C	1 m In	-10	-13	12
	2 m In	-8	-11	30
	30 sec	230	174	715
500:1BOE @ 21°C	1 m In	370	288	798
	2 m In	370	290	670
DI Water Contact Angle		79.2	77.2	72
Metrics		ER (A/m In)	ER (A/m In)	ER (A/m In)
2.5% TMAH @ 21°C	1 m In	-10	-11	24
	2 m In	-9	-7	40
	30 sec	223	215	931
500:1BOE @ 21°C	1 m In	400	307	964
	2 m In	405	313	[720]
DI Water Contact Angle		77.5	78.3	70
Metrics		ER (A/m In)	ER (A/m In)	ER (A/m In)
2.5% TMAH @ 21°C	1 m In	-4	-1	96
	2 m In	-6	-1	96
	30 sec	266	256	939
500:1BOE @ 21°C	1 m In	326	274	912
	2 m In	[351]	[319]	[722]

# Table 15

248 Abs. Comp 193 Absorbing Composition

Descriptions			+ 600ppm Stabilized TMAA	+ 600ppm TMAA
Bake temp. (C)		130/200C	130/240C	130/240C
DI Water Contact Angle				
Metrics		ER (A/m In)	ER (A/m In)	ER (A/m In)
2.5% TMAH @ 21°C	1 m In	67	-3	-5
	2 m In	62	-2	-8
	30 sec	815	158	219
500:1BOE @ 21°C	1 m In	608	171	252
	2 m In	621	173	312
	30 sec	1839		
NE-14 @ 21°C	1 m In	2815		
DI Water Contact Angle				
Metrics		ER (A/m In)	ER (A/m In)	ER (A/m In)
2.5% TMAH @ 21°C	1 m In	31	-2	-6
	2 m In	49	-2	-4
	30 sec	753	154	195
500:1BOE @ 21°C	1 m In	735	181	303
	2 m In	[805]	188	320
	30 sec	2836		
NE-14 @ 21°C	1 m In	2730		
DI Water Contact Angle				
Metrics		ER (A/m In)	ER (A/m In)	ER (A/m In)
2.5% TMAH @ 21°C	1 m In	74	-8	2
	2 m In	80	-2	1
	30 sec	839	165	234
500:1BOE @ 21°C	1 m In	742	188	282
	2 m In	655	188	315
	30 sec	1040		
NE-14 @ 21°C	1 m In	2730		

# Table 16

248  
Absorb. Comp. 193 Absorb. Composition

Descriptions			+ 600ppm Stabilized TMAA	+ 600ppm TMAA
Bake temp. (C)		130/200C	130/240C	130/240C
DI Water Contact Angle				
Metrics		ER (A/min)	ER (A/min)	ER (A/min)
2.5% TMAH @ 21°C	1 min	53	-2	-1
	2 min	56	1	-6
500:1BOE @ 21°C	30 sec	700	173	184
	1 min	688	156	253
	2 min	601	168	286
NE-14 @ 21°C	30 sec	1732		
	1 min	2825		

# Table 17

248  
AC

## 193 Absorbing Composition

Description		248.2100.200m	Rev	+ 1070ppm "optimized" APTEOS Triflate						
pH		m	A	<2						
Bake Sequence		130/200 C	130/200°C	130/180 C	130/200°C	130/220C	130/240°C	130/250C	130/280C	
500:1 BOE		50 sec	90 sec	ER	ER	ER	ER	ER	ER	ER
TMAH		1 min @	20 °C	ER	ER	ER	ER	ER	ER	ER
2.3% aq. TMAH		780	100	144	105	781	146	372	228	179
5.0% aq. TMAH		13520	298	347	256	789	782	624	406	321
10.0% aq. TMAH		13516	166	196	36	704	485	294	205	115
		13571	716	766	1381	1396	122	900	745	462
			240							332

Table 18

248 AG



193 Absorbing Composition

Description		248.2100.200mm				Rev A + 1070ppm "optimized" APTEOS Triplate + 1.5% DPG			
pH		N/A				<2	<2	<2	<2
Bake		130/200 C				130/180 C	130/200C	130/220C	130/240C
Sequence		50 sec				90 sec			
500:1 BOE	1 min @ 20 °C	ER	ER	ER	ER	ER	ER	ER	ER
	TMAH	1 min @ 23 °C	393	386	386	386	386	386	386
	2.5% aq.	50 °C	193	193	193	193	193	193	193
	TMAH	75 °C	818	110	110	110	110	110	110
5.0% aq.	23 °C	490	490	490	490	490	490	490	490
	50 °C	1028	959	959	959	959	959	959	959
	TMAH	75 °C	1028	288	288	288	288	288	288
10.0% aq.	23 °C	3130	503	503	503	503	503	503	503
	50 °C	4509	959	959	959	959	959	959	959
	TMAH	75 °C	4509	2804	2804	2804	2804	2804	2804

Table 19

248  
AC

## 193 Absorbing Composition

Description		248.2100.200m m	Rev A	+ 1070ppm "optimized" APTEOS MSA + 1.5% DPG							
pH		N/A	1.5	<2	<2	<2	<2	<2	<2	<2	<2
Bake Sequence		130/200 C	130/200°C	130/180 C	130/200°C	130/220C	130/240°C	130/250C	130/280C		
		50 sec	90 sec	90 sec	90 sec	90 sec	90 sec	90 sec	90 sec		
500:1 BOE		ER	ER	ER	ER	ER	ER	ER	ER	ER	ER
1 min @											
20°C		748	1634	1189	939	892	800	800	800	800	800
1 min @											
23°C		748	1634	1189	939	892	800	800	800	800	800
2.3% aq. TMAH		780	100	191	48	48	48	48	48	48	48
50°C		780	781	1220	507	518	201	242	226	226	226
75°C		780	781	1220	507	518	201	242	226	226	226
5.0% aq. TMAH											
23°C		780	781	1220	507	518	201	242	226	226	226
50°C		780	781	1220	507	518	201	242	226	226	226
75°C		780	781	1220	507	518	201	242	226	226	226
10.0% aq. TMAH											
23°C		780	781	1220	507	518	201	242	226	226	226
50°C		780	781	1220	507	518	201	242	226	226	226
75°C		780	781	1220	507	518	201	242	226	226	226



# Table 20

Materials	pH	Days at 40C	Mn	Mw	Mp	Mz	Mz+1	PDI
Rev A + 1070 ppm "opt" apteos triflate	1.732	0	780	1109	735	1488	1844	1.422
Rev A + 1070 ppm "opt" apteos triflate + 1.5% DPG	<2	5	1062	1568	1329	2188	2853	1.476
Rev A + 1070 ppm apteos msa + 1.5% DPG	<2	0	891	1269	754	1722	2179	1.424
		7	1058	1486	1198	1995	2520	1.404
		0	880	1241	749	1680	2127	1.41
		7	1006	1410	1175	1887	2364	1.402

193 Absorb. Comp.

5 days at 40C	193AC	Mn	Mw	110 nm via fill
pH1.5 + 2000ppm nitric acid acidified TMAA		1289	1641	No voiding



# Table 21

248  
AC | 193 Absorbing Composition (AC)

Description	248.2100.200 mm	Rev A	pH 5.5	Rev A + 1070ppm APTEOS Nitrate	Rev A + 1070ppm APTEOS Nitrate + 1.5% DPG	Rev A + 1070ppm APTEOS Nitrate + 3% DPG	Rev A + 1070ppm APTEOS Nitrate + 6% DPG	Rev A + 1070ppm APTEOS Nitrate + 9% DPG
pH	N/A	1.5	5.5	<2	<2	<2	<2	<2
Bake	130/200 C	130/200°C	130/240 C	130/240 C				
Sequence	50 sec N2	90 sec N2	60 sec N2	90 sec N2				
500:1 BOE	ER	ER	ER	ER	ER	ER	ER	ER
20°C	175	1503	1502	149	1454	970	147	26
1 min @		Pre						
23°C		2694						
50°C	525	2663						
75°C	2702	2702	142	117	356	224	347	463
5.0% aq. TMAH	485	2679						
23°C		2723						
50°C	353	2699						
75°C	353		339	119	508	259	524	776
10.0% aq. TMAH	311	2687						
23°C	311	2670	142	31	81	106	30	30
50°C	311							
75°C	311	2706	859	219	1040	546	1075	1373

Table 22-

Description	Thickness	1 dev	Reflectance @ 193nm	n @ 193nm	k @ 193nm
193 Rev A	1469	12.2	9.77	1.8027	0.3811
193 Rev A + 1070 ppm APTEOS Triflate	1502	15.4	10.26	1.8019	0.3469
193 Rev A + 2140 ppm APTEOS Triflate	1514	12.1	10.33	1.7945	0.3304
193 Rev A + 5350 ppm APTEOS Triflate	1509	15.4	10.18	1.7931	0.3362
193 Rev A + 8025 ppm APTEOS Triflate	1512	9.7	10.19	1.7918	0.3329
193 Rev A + 10700 ppm APTEOS Triflate	1506	12.7	10.15	1.7958	0.3427
193 Rev A + 25000 ppm APTEOS Triflate	1500	12.2	10.14	1.7998	0.3526
193 Rev A + 40000 ppm APTEOS Triflate	1533	10.5	10.16	1.7793	0.3276

193 Absorbing Comp.

Table 23

ppm APTEOS Triflate	40C Aging	Mn	Mw	Mp	Mz	Mz+1	Polydispersity
193 + 1070ppm APTEOS Triflate	0	920	1283	759	1724	2173	1.395362
	5	1279	1681	1405	2174	2706	1.314284
193 + 2140 ppm APTEOS Triflate	0	754	1119	744	1562	2000	1.483957
	5	955	1378	788	1897	2455	1.442483
193 + 5350 ppm APTEOS Triflate	0	876	1226	754	1640	2046	1.39940
	5	984	1367	779	1819	2268	1.38917
193 + 8025 ppm APTEOS Triflate	0	877	1228	754	1646	2058	1.40051
	5	988	1369	1112	1812	2247	1.38518
193 + 10700 ppm APTEOS Triflate	0	875	1226	755	1642	2052	1.40143
	5	1001	1396	1156	1860	2320	1.39492
193 + 25000 ppm APTEOS Triflate	0	846	1204	764	1635	2060	1.42421
	5						
193 + 40000 ppm APTEOS Triflate	0	835	1169	755	1558	1930	1.39928
	5	846	1260	773	1726	2168	1.489298

193 Absorb. Comp.

Table 24

## 248 AC 1 193 Absorbing Composition

Description	248.2100.200mm	Rev A	Rev A + 10,700 ppm APTEOS Triflate (10X)	Rev A + 40,000 ppm APTEOS Triflate (37X)
pH	N/A		<2.5	<2.5
Bake	130/200 C	130/200 C	130/240 C	
Sequence	50 sec N2	90 sec N2	90 sec N2	
500:1 BOE	ER	ER	ER	ER
TMAH 1 min @ 20°C	75	100	334	1225
2.5% aq. TMAH	493	100	334	1225
5.0% aq. TMAH	287	298	309	809
10.0% aq. TMAH	166	166	162	878

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

☐ **BLACK BORDERS**

☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**

☒ **FADED TEXT OR DRAWING**

☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**

☐ **SKEWED/SLANTED IMAGES**

☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**

☐ **GRAY SCALE DOCUMENTS**

☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**

☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**

☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**